meta

the news digest magazine

Volume XXVII-No. 12 December, 1954

WHY?

MORE FOR YOUR MONEY

PATENTS ISSUED—OTHERS PENDING:

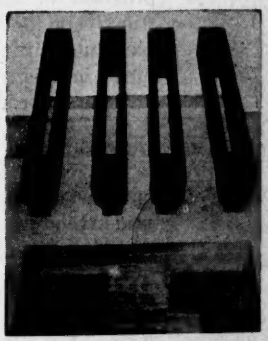
2,002,180 — 2,046,822 — 2,188,063 — 2,237,434 — 2,249,581 — 2,252,319 — 2,299,186 — 2,309,745 — 2,338,433 — 2,347,400 — 2,349,767 — 2,354,753 — 2,370,959 — 2,370,960 — 2,394,777 — 2,395,329 — 2,395,614 — 2,400,511 — 2,415,493 — 2,415,494 — 2,421,224 — 2,426,773 — 2,431,479 — 2,474,674 — 2,464,508 — 2,477,561 — 2,512,206 — 2,516,516 — 2,537,830 — 2,601,864.

SALES 80% PLUS:

As a matter of interest to you, a minimum of 80% of Holden products, whether applied to furnace or salt baths, are manufactured under patents issued or pending.

FOREIGN COUNTRIES:

In many of the foreign countries Holden products are covered by issued patents—this is more practically true of countries which are our allies—Canada, Great Britain, France, Italy, South Africa, Australia, Sweden, Brazil, and others.



Type 701-4 Submerged Electrode Unit with ceramic pot for neutral hardening and annealing 1000-2300°F.

Aluminum Heat Treating

Desanding—Descaling 18,000 lbs. per hr.—1800 KVA

More For Your Money Means Basically The Following:

1. Production of furnace equipment which has lower maintenance cost than any competitive type of salt bath equipment, regardless of the method of heating.

2. A minimum of down time regardless of type of heating, therefore, more production for the same dollar of original purchase.

3. In many cases, the designs as developed for electrical electrode furnaces have indicated 15 to 20% greater productive use or saving when these principles are applied to competitive furnaces.

(See Back Cover)

THE A. F. HOLDEN COMPANY

THREE F.O.B. POINTS—LOS ANGELES, DETROIT and NEW HAVEN

P.O. Box 1898 New Haven 8, Conn.
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Position Open on ASM Staff . . .

- This director of metals engineering education for ASM should have superb qualifications as a metallurgist (preferably a Ph.D. degree) but he should be much more than a scientist—he should be one who cares deeply about the practical consequences and the day-by-day usefulness of applied metallurgy in industry.
- He should have a conviction that metallurgical engineering can be brought to occupy a much larger place in industrial affairs than it does today. He should feel that the soundest method for achieving this larger place and recognition is through a broad program of adult education, which he will administer. He should understand instinctively the needs of design engineers and process engineers for this type of supplementary training in metals, and should be able to sense the still broader opportunities inherent in the training of large numbers of subprofessional technicians, draftsmen and production supervisors along the same lines.
- He should be able to glimpse a future metalworking industry in which metallurgy is the recognized and respected basis for all operations and in which a very large number of engineering and supervisory production personnel will have a common understanding of the importance of metallurgy because of their participation in the ASM correspondence courses in metals engineering.
- The man selected for this position should, of course, have the ability to plan and evaluate instructional materials. No less important, he should be endowed with the personal qualities and the persuasiveness necessary to win friends for this program among the top managements of metalworking companies as well as his colleagues in the headquarters' staff.
- He should be capable of growing with his own program, for this activity, skillfully administered, may justifiably become the largest department of the ASM.
- The new appointee, a metallurgist of 35 or under, might be either a young man who now contemplates leaving a university post and who has had some prior industrial experience, or one who now heads a small group or department in industry and has had some previous teaching experience which he enjoyed. The responsibilities and starting salary will be commensurate with those of a full professor of metallurgy in a leading universty.
- Please send a resume of your qualifications and experience to:

W. H. Eisenman, Secretary
American Society for Metals
7301 Euclid Avenue
Cleveland 3, Ohio

Metals Review

VOLUME XXVIII, 12 December, 1954

THE NEWS DIGEST MAGAZINE

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DEPARTMENTS

ASM REVIEW OF METAL LITERATURE

A.S.M. to Europe— Germany

A 20th Century Locomotive—Symbol of German Progress—Steams Behind the Impressive Portals of the 13th Century Cologne Cathedral

A.S.M. members visiting Germany during the Joint Metallurgical Societies Meeting in 1955 will see three of Germany's liveliest and most historic Rhine River cities—Duesseldorf, Cologne and Bonn, as well as the nearby city of Essen on the Ruhr, a Rhine tributary.

Each of these cities has a different personality, and their variety typifies the surprises which all West Germany holds for the 160,000 Americans it welcomes annually.

Without divulging enough to rob these surprises of their impact, a brief preview of the four cities, including points of interest which potential visitors will want to jot down, is presented below.

Essen

Essen, the largest city of the Ruhr Valley, and the forge of Europe, thrives on the production of iron and metals, hard coal mining and coke works. Since the war, new industries have located in Essen, and some older ones have diversified their products. Textiles, chemicals and glass are produced in Essen today, and the Krupp works, once the armorers of Germany, is turning out locomotives and other heavy goods which contribute to the peace-time prosperity of Germany and Europe.

Feverish industrial activity does not, however, make Essen a town of soot and coal dust. In rebuilding, the city fathers surrounded factories and commercial concerns with open green areas from which one can look up to the wooded hillsides, cleft by sparking streams, that surround the 1100-year old city.

Essen's ancient history is recalled by its Minster, a Romanesque cathedral whose golden statue of the Madonna dates from the 1st Century A.D. In contrast with this reminder of ages past is the collection of modern paintings hanging in the Folkwang Museum, and includes Van Gogh's "Portrait of a Young Man". For those in search of out-door recreation, it is only a few minutes ride on a street car to the 6-mile long Baldeney Lake, where swimming, sailing and other aquatic sports refresh the traveler seeking a pause in sightseeing and convention rounds.

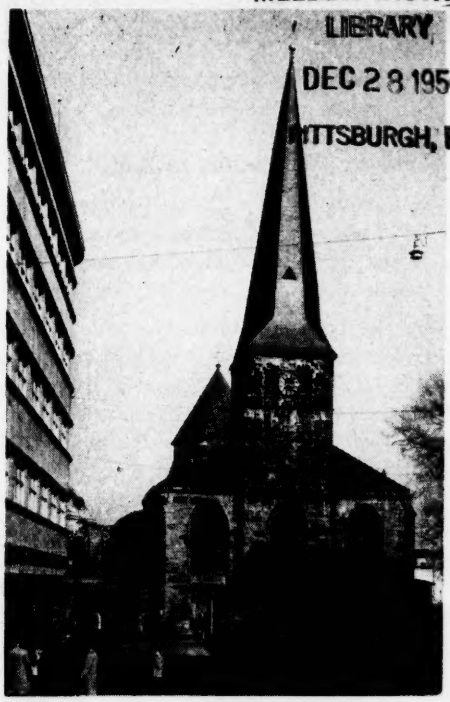
To the north of Essen lies Muensterland, a wide plain dotted with ancient ivy-clad castles, and to the south, on the way to Duesseldorf, is Bergischesland, where medieval abbeys and manors alternate with busy towns engaged in weaving and dying, metalworking and chemical manufacturing. In the heart of Bergischesland is the Wupper Valley and the city of Wuppertal, whose suspension railway or sway-way, built 54 years ago and running for nine miles along the Wupper River, is today attracting world-wide attention as a possible solution for urban and interurban traffic problems.

Duesseldorf

In Duesseldorf, A.S.M. members will find one of the newest cities in Germany. Concrete, chrome and glass buildings sparkle with pristine glisten against the green trees and strips of lawn which line and divide the city's main streets. Rebuilt factories, producing iron, steel, chemicals, pharmaceuticals and cosmetics, are located outside the city. In 1945, almost half of the homes and nearly all of the factories and shops in Essen had been destroyed or irreparably damaged. Today, it is one of the main trading centers of North Germany, and the heart of the fashion industry. Wives of A.S.M. visitors will revel in the shops along the Koenigsallee, a fashion mart not only of Germany but of all Europe.

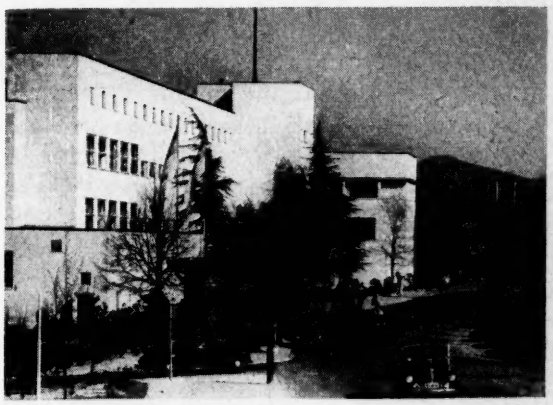
Cologne

Down the Rhine from Duesseldorf lies Cologne, one of the most startling examples of the contrast between old and new which gives Germany such vivid appeal. The fretwork spires of Cologne's 13th Century cathedral cast long shadows across the front of a steamlined office building; 20 railroad lines converge above underground catacombs which contain the tombs of Roman soldiers and Frankish



1st Century A.D. Church in Essen Is Surrounded by Offices of Textile, Chemical and Glass Firms

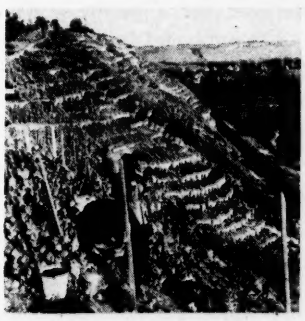
One of the Chief Tourist Attractions To Be Found in the City of Bonn Is Beethoven's Birthplace



The Bundeshaus in Bonn, the Meeting Place of Elected Representatives From the Nine German States or "Laender"

conquerors. Founded in 38 B.C. and named for a Roman empress born on the site, Cologne was one of the great trading centers of the Hanseatic League in medieval times. Today the tradition of trade is promoted by myriad business associations which make their headquarters there. Cologne produces a wide variety of goods, from automobiles and cables to chocolate and beer, including, of course, the famous eau de Cologne.

Visitors to Cologne should be sure to see the cathedral—they should climb to the south tower for a breathless view of the surrounding countryside ringed by seven mountains—and the Romanic-Ger-



The Vineyards Which Line the Rhine River Produce Over 100 Different Types of World-Famous Wine

Above: The First Aluminum Bridge in Europe Spans the River in Dusseldorf. Right: Duesseldorf's Main Street Is a Fashion Mart for All Europeans

man museum and the Schnuetgen Museum of medieval ecclesiastical art.

Bonn

Bonn, capitol of the German Federal Republic, is a city that was founded by the Romans before the birth of Christ. Birthplace of Beethoven, whose home is one of Bonn's tourist sights, it is also the seat of a famous law university on whose faculty some members of the federal government teach.

When this quiet university town became the capitol city of free Germany, it underwent rapid transformation. The Federal Chancellery was moved into the natural history museum, then into a graceful white mansion, once the home of old German royalty. The Coblentzerstrasse, where most of the government buildings are located, has lost its cobblestones and become a tree-lined thoroughfare, and a helicopter service now operates from one of the town squares. Reminders of the Middle Ages, however, are found in the old Muenster, once the setting of the coronations of German emperors.

Trip on the Rhine

A Sunday train and steamer trip on the Rhine has been planned in connection with the tour of these four cities. The broad river slices an ever-changing panorama from pink and white orchards abloom against a background of dark green wooded slopes to majestic crags topped by turreted castles. It is from one of these crags, near St. Goar, that legend maintains the songs of the Lorelei lured sailors to their death. Along the banks of the river grow the thick vineyards which produce more than 100 different types of famous Rhine wine.

From time to time on the boat part of the Rhine trip, you will pass under one of the graceful bridges built to replace the old bridges destroyed by bombs. You will also notice that the river is busy with freighters of all Europe, for the Rhine is not only a romantic route for tourists but a vital one for trade.

A.S.M. members will find a warm welcome in Germany from a people who speak their language, both figuratively and literally. English is spoken in all of Germany's big cities, and surprisingly enough, by most of the children in the small towns and villages. German cities hum with the overtones of high-speed production so familiar to American ears.

Germany Welcomes A.S.M.

German hospitality has a special quality—innkeepers, hotel managers, restaurant owners, policemen, bus drivers, train conductors, all regard the visitor as a personal guest and treat him accordingly.

Everywhere the traveler will find a wide choice of entertainment—from stage and musical performances, a variety of nightclubs, to delightful cafes and restaurants. German food is astonishingly good and highly imaginative. Regional specialties the visitor should be sure to order include potted hare baked in Madeira wine, brandy and burgundy, rosy Rhine salmon steamed with onions, Speissbraten, meat which has been soaked in spice for a day, then barbecued on beechwood sticks over an open fire, a bean dish in which the beans, leaves and pods are simmered for hours with large chunks of bacon and served with a thickened gravy, and, of course, the world-famous Westphalia ham.

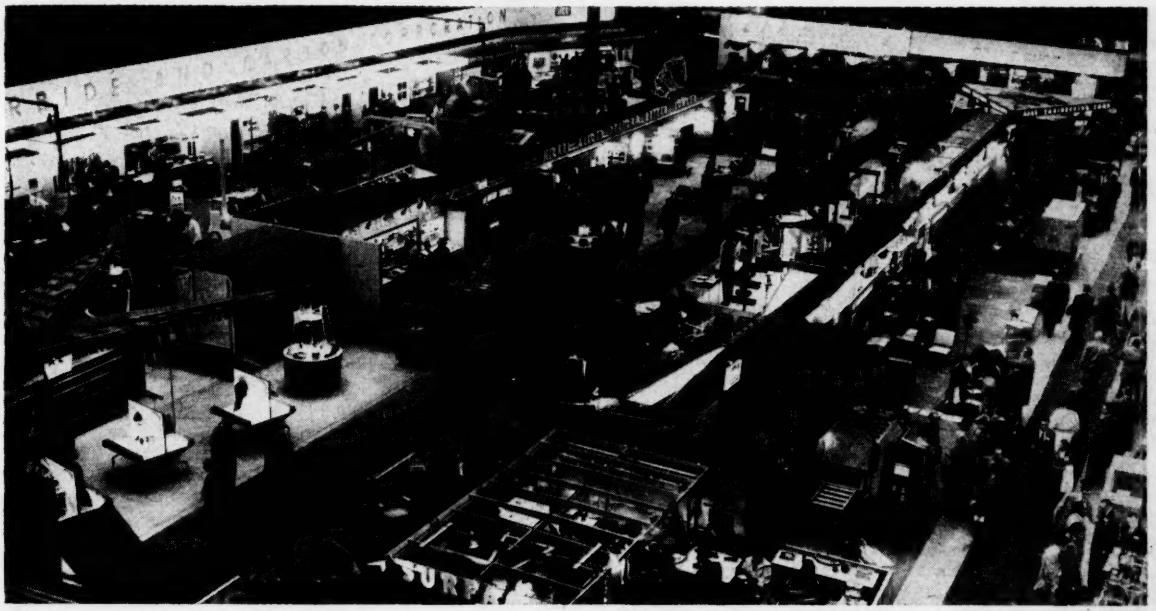
The wines, beers and liqueurs of the North Rhineland should all be tried, but especially a pale Dortmund beer called Helles Dortmunder, and an amber beer called Altbier. Calorie-conscious beer lovers will find a treat in Cologne's Wiess or Koelsch, highly refreshing beers which are tangy but have low alcoholic content. Most beers in this region are downed with a side order of Korn, a potent white, liqueur-like drink with a rye base which comes in a variety of flavors from bacon to raisin. Special wines to try, in addition to famous vintage names, include Drachenblut (Dragons' blood), Ahr-Burgunder, a high-proof red wine, and Viez, made from crabapples and very close to an American applejack, both in flavor and effect.

Germany would not be complete without a visit to one of the wine villages, such as Ruedesheim, which is on the A.S.M. itinerary. Since the visitor will reach this village on Sunday, he may see some native costumes. If he is lucky enough to steal some time from his official calendar to visit several small villages, he may find himself dancing in the square at a flower fair, or taking part in a fish stabbing contest along the river bank.

From the night glow of the steel blast furnaces in the Ruhr to moonlight on the Rhine, from the black smoke with which Ruhr factories write their progress stories on the sky to the crumbling towers of the Rhine castles, the visitor will find a region which combines realism with romanticism, and hosts who are anticipating their chance to show A.S.M. members a bit of Germany today.

The above article was written for *Metals Review* by the German Tourist Information Office.

National Metal Exposition—A Summary



When the doors of the International Amphitheatre in Chicago closed at 6:30 p.m. Friday, Nov. 5, the 36th National Metal Show became a matter of record. . . . a record boldly stamped "Success".

This year's big show broke every existing Metal Show record for number of exhibitors, display space used, visitors and new products and processes introduced.

While it is still too early for accurate returns, activity on the floor during the week indicated that this was the biggest year ever for sales. Last year, it will be remembered, sales soared to over 2½ million dollars before the show was half over.

As in every other Metal Show, a theme was developed almost the moment it opened; key word for 1954 was "new".

This year's program noted every new product being shown for the first time during the week of the show. Even a casual glance through the listing is proof enough that exhibitors saved everything they had developed in the past year for introduction at the Metal Show, further proof that the show is indeed the "Metals Marketplace of the World".

A subtle change of direction was apparent at the 1954 Metal Show. It was made clear this year that the metals industry is rising to meet the challenge presented by developments being made in channeling atomic energy for industry.

A number of new alloys were shown and drew more than a little interest. It is worth noting that in the past quarter century, a list of alloys published by A.S.M. has grown from 2265 to a whopping 20,000 entries. Tip-off on the direction of metallurgical research is that the alloys shown are designed to stand greater stresses, strains and temperatures.

Also high on the list of attractions were several applications of furnaces for producing refractory metals—a direct lead to the urgent need for atomic-age material.

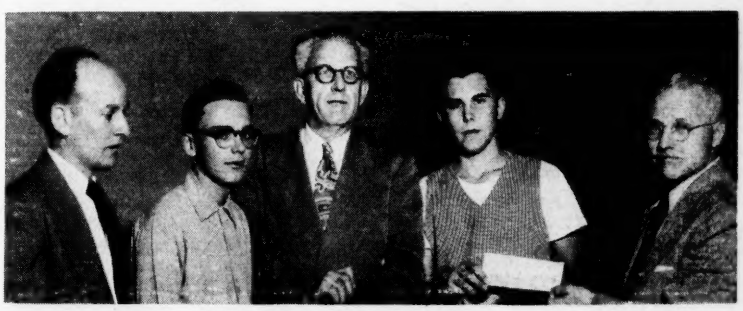
More than ever this year, the Congress portion of the week's program drew visitors who came for the express purpose of listening to technical papers. A high spot of the technical program was three sessions sponsored jointly by A.S.M. and the Industrial Heating Equipment Association, which drew a top attendance of 700 at the opening meeting—typical of the great interest shown in meetings sponsored by the four cooperating societies.

Putting together scattered pieces of information picked up at the show leads to a clear-cut conclusion: The metals industry has been elevated to a position of prominence in the drive for mastery of super-power.

Heart-warming high spot of the meeting was the annual banquet where accolades for work well done were passed on to well-deserving award winners.

Guest speaker at the banquet was Lawrence A. Kimpton, chancellor at the University of Chicago. He outlined the responsibility shared by industry and universities for continued progress in the metals field.

Inland Empire Presents Science Awards



Scientific Know-How Earned Recognition for Lewis and Clark High School Students, Dave Hirte, Who Tied for a Third-Place Award, and Bob Dycus, Who Won an Honorable Mention, in the A.S.M.-Sponsored Future Scientists of America Program. Pictured are, from left: Francis M. Krill, chairman of the Inland Empire Chapter; Bob Dycus; high-school principal A. L. Parker; Dave Hirte; and H. M. Louderback, Lewis & Clark science teacher

Winners in A.S.M. Metallographic Exhibit

National Metal Exposition, Chicago, Nov. 1-5, 1954

Best in Show

Grand Prize of $100

R. D. Buchheit, J. E. Boyd, A. A. Watts and F. C. Holden
Battelle Memorial Institute
Columbus, Ohio
"Alpha Formation in a Beta Titanium Alloy"

Carbon and Alloy Steels

Best In Class: Mary E. Potter, U. S. Steel Corp., South Works, Chicago—"Hadfield's Manganese Steel—Pro-Eutectoid Carbide Isothermally Precipitated".

Honorable Mention: T. Richard McKinney, General Motors Corp., Detroit—"Ferrite Grain Structure in Tempered Bainite".

Honorable Mention: Stephanie Hacklaender, C. C. Kawin Co., Chicago—"Austenite Twins in Hadfield's Manganese Steel".

Aluminum, Magnesium, Beryllium and Titanium

Best in Class: R. D. Buchheit, J. E. Boyd, A. A. Watts and F. C. Holden, Battelle Memorial Institute, Columbus, Ohio—"Alpha Formation in a Beta Titanium Alloy".

Honorable Mention: James R. Dvorak, Armour Research Foundation of Illinois Institute of Technology, Chicago — "Isothermal Transformation of Titanium Alloy Containing 4 Cr and 3 Mo".

Honorable Mention: D. L. Robinson, Aluminum Co. of America, New Kensington, Pa. — "Subgrains in High-Purity Aluminum as Revealed by Use of Cubic Etch Pits".

Copper, Nickel, Zinc, Lead and Their Alloys

Best in Class: J. J. de Jong, Philips' Research Laboratory, Eindhoven, Holland—"Copper—Beryllium Internally Oxidized in Air".

Honorable Mention: Atsushi Iwata and Toshio Doi of Nitachi, Central Research Laboratory, Tokyo, Japan—"Surface Structure of Solidified Copper in High Vacuum".

Honorable Mention: L. Delisle Pellier, American Cyanamid Research Division, Stamford, Conn.—"Electron Micrograph of Annealing Twins in Copper".

Welds and Other Joining Methods

Best in Class: G. B. Herrington and R. H. Sozanski, Applied Research Laboratory, United States Steel Corp., Pittsburgh—"Single Vee Butt Welded Specimen of a Quenched and Tempered Alloy Steel".

Honorable Mention: Erwin R. Cprek, Research Laboratories Div., General Motors Corp., Warren, Mich.—"Copper Brazed SAE 1010 Steel Panels Showing Penetration of Copper Into Grain Boundaries of the Steel".

Honorable Mention: Stephanie Hacklaender, C. C. Kawin Co., Chicago—"Weldments of Mild Steel Plates".

Surface Phenomena

Best in Class: Malcolm J. Fraser, Rensselaer Polytechnic Institute. Troy, N. Y.—"Thermally Etched Structures on Chromium".

Results by Unconventional Techniques

Best in Class: Robert O. Quinn, American Can Co., Maywood, Ill.—"Armco Iron—Measurement of Depth of Chemical Attack on Different Crystal Faces".

Honorable Mention: S. R. Rouze and W. L. Grube, Research Laboratories Div., General Motors Corp., Detroit—Two-Beam Interference Microscopy; Studies of Surface Finish and of Incipient Corrosion".

Honorable Mention: M. L. Picklesimer, J. C. Gower and E. P. Griggs. Oak Ridge National Laboratory, Oak Ridge, Tenn.—"Zirconium—3 At.% Silver; Chemically Etched and Electrolytically Anodized".

Honorable Mention: J. B. Newkirk, Metals Research Dept., General Electric Co., Schenectady, N. Y.—"Perfect CdI_2 Crystals Growing in an Aqueous Solution".

Slags, Inclusions, Refractories, Cermets

Best in Class: Winifred Oakes, U. S. Steel Corp., South Works, Chicago—"Blast Furnace Flue Dust Sinter".

Honorable Mention: C. A. Fournier, Ford Motor Co., Aircraft Engine Div., Chicago—"Ferrochromium Inclusion in Titanium".

Metals and Alloys Not Otherwise Classified

Best in Class: William C. Coons, Climax Molybdenum Co. of Michigan, Detroit—"Recrystallization of Wrought Molybdenum".

Honorable Mention: William C. Coons, Climax Molybdenum Co. of Michigan, Detroit—"Slip Marking on the Surface of a Grain of Molybdenum".

Honorable Mention: Harriet P. Roth, Nuclear Metals, Inc., Cambridge, Mass.—"Zirconium, Electropolished; Steps During Gradual Removal of a Disturbed Surface Layer".

Series Showing Transitions or Changes During Processing

Best in Class: Robert M. Slepian, Westinghouse Electric Corp., East Pittsburgh, Pa.—"An Experimental Precipitation Hardening Alloy".

Honorable Mention: L. Delisle Pellier, American Cyanamid Research Division, Stamford, Conn.—"Grain Boundaries and Sub-Grain Structures in OFHC Copper".

Honorable Mention: Edmund J. Klimek and James R. Dvorak Armour Research Foundation of Illinois Institute of Technology, Chicago—"Study of Alpha Prime Needles Formed in Titanium, 13% Mo Alloy on Quenching From 1000° F."

Iron, Cast and Wrought

Best in Class: Stephanie Hacklaender, C. C. Kawin Co., Chicago—"Wrought Iron—Cross Section of a Rose-Damascus Steel".

Honorable Mention: Stephanie Hacklaender, C. C. Kawin Co., Chicago—"Ductile Cast Iron—Graphite Nodule Surrounded by Ferrite".

Stainless Steels and Heat Resisting Alloys

Best in Class: Mary E. Potter, U. S. Steel Corp., South Works, Chicago—"Differentiation of Sigma and Carbides in a 27% Cr Stainless Steel".

Honorable Mention: P. Lillys and C. Feng, Crucible Steel Co. of America, Harrison, N. J.—"Discontinuous Precipitation in 18 Cr, 16 Mn Austenitic Stainless".

Briefs Lehigh on Induction Heating

A. F. Kindt, Chapter Chairman, and W. Childs, Program Chairman, Congratulate Joseph F. Libsch on His Talk on "Metallurgical Aspects of Induction Heating" Given Before Lehigh Valley Chapter. N. H. Halliday, secretary, looks on. From left: Mr. Halliday, Mr. Kindt, Dr. Libsch and Mr. Childs

Speaker: Joseph F. Libsch
Lehigh University

Joseph F. Libsch, professor of metallurgy, Lehigh University, and metallurgical consultant for Lepel High Frequency Laboratories, presented an address on "Metallurgical Aspects of Induction Heating" at a meeting of the **Lehigh Valley Chapter.**

Dr. Libsch first gave a brief historical review of induction heating principles and methods, indicating that patents were issued for the process as early as 1850 and 1900. Modern applications of these principles to heat treatment are due to the efforts of E. F. Northrup, prior processes having been mainly for melting.

Dr. Libsch emphasized that the same metallurgical principles that apply in conventional furnace heating also apply in induction heating, providing due consideration is given to time and temperature. The influence of short heating times upon carbide solution, austenitic grain growth, prior structure, superhardness and the appearance of "pearlite ghosts" during induction heating was illustrated with slides. Tempering may also be accomplished by induction heating if higher tempering temperatures are used to compensate for shorter times.

The steels that respond most readily to induction hardening are the plain medium carbon, or those alloyed with noncarbide-forming elements. Temperatures 100 to 300° F. higher than normal austenitizing temperatures are required for those steels alloyed with carbide-forming elements to obtain similar transformation characteristics. These principles were illustrated by several slides showing the TTT characteristics for both conventional and induction heated samples.

It has been learned that a sorbitic structure, obtained by a prior quench and temper, provides most rapid response to induction hardening. As-rolled structures containing massive free ferrite are to be avoided in short heating cycles.

A brief summary of recent applications of induction heating, which are in practice or under investigation at the present time, included: surface hardening of ductile iron; super-purification of nonferrous metals; and spectrographic analysis of molten metals.

Dr. Libsch supplemented his talk with an interesting display of induction hardened and fabricated parts. **—Reported by F. H. Ulrich for Lehigh Valley Chapter.**

Purdue Members Visit University Physics Labs

Speaker: K. Lark-Horovitz
Purdue University

Purdue Chapter's guest speaker at a recent meeting, K. Lark-Horovitz, chairman of the department of physics at Purdue, presented a talk on "Activities in Physics Research at Purdue".

Dr. Lark-Horovitz, who has been associated with the department for the past 26 years, stated that both fundamental research and applied research are in progress. In fundamental research, many studies are being conducted; for example, the nature of isotopes, intrinsic conductivity of semiconductors, and laws and theories of solid state physics. In applied research, investigations are being made of germanium photocells and on the effect on properties of metals exposed to nuclear radiation.

K. Lark-Horovitz

Following Dr. Lark-Horovitz's talk, members were taken through the major divisions of the department of physics. A brief description of the major studies being conducted in each division was made, with a demonstration where feasible.

In the electron diffraction division, a demonstration of the Vickers metallographic microscope, modified with a Bergsman microhardness tester, was given. With this equipment, the effect on the hardness of metals exposed to nuclear irradiation can be studied.

In the solid state division lab, a demonstration was given of the study of semiconductors with impurities which can be controlled to one part in one million. The intrinsic conductivity and impurity conductivity are also studied and compared.

The fundamental work being conducted in the biophysics division is concerned with the difference in the physical aspects of living and inert matter. Some of the problems under study include the reproductive mutations and the crystalline molecular structure of a common virus culture. **—Reported by J. J. Phillips for Purdue Chapter.**

ASM-SLA System To Be Revised; Suggestions Invited

The ASM-SLA Classification of Metallurgical Literature has reached a stage in its development where a re-evaluation and possible revision appear to be desirable. The Classification was published four years ago and the first printing is now nearing depletion.

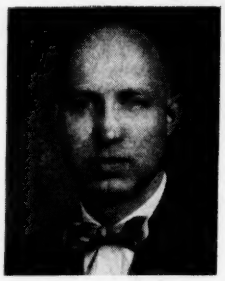
The Classification was purposely designed to permit considerable latitude for individual expansion. In order that its usage may be maintained as uniform as possible, it appears desirable that these individual expansions be collected, collated and possibly incorporated into the printed classification scheme. This can doubtless be done—and existing defects, inconsistencies and omissions corrected—without unduly disturbing the present framework.

A further reason for action at the present time is that a committee has been appointed by the International Federation of Documentation to study the Classification thoroughly and suggest revisions and improvements so that it can be presented for adoption as an international standard.

The experience of individual users of the system would provide invaluable information, both for a revised printing in this country and for study by the international committee. The active assistance of such users is therefore urgently requested.

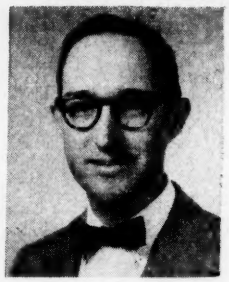
Comments, criticisms and expanded outlines would all be most welcome, and should be addressed to *Metals Review*, 7301 Euclid Ave., Cleveland 3, Ohio.

Meet Your Chapter Chairman



A. M. Montgomery

D. F. Davis



J. C. Danec

CLEVELAND

ALLEN MARSHALL MONTGOMERY, chairman of the Cleveland Chapter, was born in Aspinwall, Pa., in 1915. He attended primary and high school in Aspinwall and was graduated from Carnegie Institute of Technology in 1937 with a B.S. degree in metallurgical engineering. He continued with graduate work at Carnegie Tech, receiving an M.S. degree in metallurgy in 1939. He started to work with the Cleveland Division of the Aluminum Research Laboratories of Aluminum Co. of America in 1939 where he is now assistant chief of the division.

Al married Dorothy Millar in 1940 and they have two children, Dick, 13, and Betty Ann, 8. He is a member of the British Institute of Metals, the National Association of Corrosion Engineers, and the D-19 Committee of the American Society for Testing Materials. He enjoys camping, canoeing and home woodworking.

LOUISVILLE

HARRY D. BITNER, chairman of the Louisville Chapter, is chief fabrication engineer of the General Sales Division of Reynolds Metals Co. For the past six years his work has been centered around customer service in the fields of machining, forging and extrusion of aluminum alloys.

Mr. Bitner was born in Union, Ind., and was graduated from Purdue University in 1930, when he went to work for the Aluminum Co. of America. He joined Reynolds in 1935 as chief research metallurgist, and, before assuming his present duties, held positions as assistant chief metallurgist, assistant plant manager and plant manager.

He is married and is the father of a boy and a girl. Mr. Bitner is a Mason, a member of the Wire Association and the Kentucky Society of Professional Engineers. He has served as chairman of the public relations committee and as vice-chairman of the Louisville Chapter A.S.M. He claims no special hobby but enjoys spectator sports.

WORCESTER

JOSEPH C. DANEC, chairman of the Worcester Chapter, is technical assistant to the production engineer, Norton Behr-Manning Overseas Inc. He was graduated from Lafayette College in 1939 with a B.S. degree in chemical engineering, and worked as a research engineer in the process metallurgy division, Battelle Memorial Institute, before joining Norton in 1941.

Mr. Danec, who was born in Columbus, Ohio, in 1917 and attended primary and high school there, is married and has three children, Nancy-Jo, 12, Dorothy, 8, and Deborah Joan, 4. He is a member of the Worcester Engineering Society and Christ the King Holy Name Society. He served as chairman of Worcester Chapter's educational committee for three years, and as a member of the chapter's executive committee for three years, and is on the powder metallurgy committee of ASTM B-9.

Joe enjoys golf, color photography, baseball and bowling, when he can find time off from his family and his work.

MONTREAL

JAMES U. MACEWAN, chairman of the Montreal Chapter, was graduated from Queen's University, Ontario, in 1922 with a B.S. degree in metallurgy, and subsequently obtained his M.S. degree from the Montana School of Mines in 1933. He spent several years in the lead smelting industry before entering the teaching profession. He taught for five years at Montana School of Mines and joined the staff of McGill University, Montreal, in 1936, where he is now chairman of the department of metallurgical engineering.

MAHONING VALLEY

EUGENE M. SMITH was born at Bethlehem, Pa. He received a B.S degree in metallurgical engineering from Lehigh University in 1942 and a M.S. degree from Ohio State University in 1949.

Mr. Smith has been with Youngstown Sheet and Tube Co. since 1949 as a development engineer in the mill research and development department. He also teaches in the evening at the William Rayen School of Engineering of Youngstown College.

Before coming to Youngstown, Mr Smith was a research engineer at Battelle Memorial Institute, and from 1942 to 1944, he was operating engineer at the New Kensington, Pa., extrusion plant of the Aluminum Co. of America.

In addition to his present job as chairman of the Mahoning Valley Chapter, Mr. Smith is vice-president of the Mahoning Valley Technical Societies Council and vice-president of the Youngstown Lehigh Club. He retains his interest in U. S. Maritime affairs through association with former classmates on the schoolship *Annapolis*, the Pennsylvania merchant marine officers academy.

Mr. Smith is married and has a young daughter, Ann Gladys. Besides his interest in salt water activities, his hobbies include technical writing and study of corporation finance.

FORT WAYNE

DONALD F. DAVIS, chief metallurgist, Central Steel & Wire Corp., received his B.S. in metallurgy from University of Notre Dame in 1948. He was employed as a metallurgical investigator for the Salisbury Axle Division of the Dana Corp. after leaving school, eventually becoming chief metallurgist for the same company, before going to Central.

Don was married in 1947 and he and his wife have a daughter, born in 1949. Golf, fishing and stamp collecting are his hobbies, and he is kept active in the Society of Automotive Engineers, Fort Wayne Chamber of Commerce and the Fort Wayne Foremen's Club. He has served as treasurer, secretary and vice-chairman for Fort Wayne Chapter. Don spent four years in the Navy in the Caribbean Area aboard patrol craft, and is presently an ensign in the Reserve.

J. U. MacEwan

H. D. Bitner

E. M. Smith

Graphitic Toolsteels Topic of Chattanooga Talk

A. F. Sprankle, Timken Roller Bearing Co., Spoke on "Manufacture and Metallurgy of Graphitic Toolsteel" at a Meeting of the Chattanooga Chapter. He is shown above with officers and guests of the Chapter. From left: A. Flowers, chairman; Howard Sutton; Jack Stocker, vice-chairman; L. N. Wall, secretary-treasurer; Mr. Sprankle; Carl Berndt; Harold Dicks; and Jack Troy, Sports Round-Up Coffee Speaker of the Meeting

Speaker: A. F. Sprankle
Timken Roller Bearing Co.

"Manufacture and Metallurgy of Graphitic Toolsteel" was the subject of a talk given by A. F. Sprankle, metallurgist, Timken Roller Bearing Co. at a meeting of the **Chattanooga Chapter.**

Mr. Sprankle described the beginning of graphitic toolsteels, which were originally used primarily in die making. With slides, he illustrated the use of the electric furnace with the new induction stirrer which has improved quality by lowering phosphorus and sulfur as well as speeding production. Mr. Sprankle then explained the importance of controlled ratio of graphite to carbide and the means of this control by proper balance of carbide to ferrite forming elements during melting. Slides of micrographs were used to illustrate graphite contents and distribution for the several types of graphitic steels. Improved machinability in graphitic toolsteels was shown by slides of testing machines and charts of results of tests. Applications of the use of graphitic toolsteel, especially in dies, were also illustrated.

Mr. Sprankle concluded with three theories to explain the improved machinability and wear resistance of graphitic toolsteel: Surface film given by graphite; graphitic pockets which furnish reservoirs to hold lubricants; and graphitic pockets which hold externally introduced hard particles.—**Reported by J. H. McMinn for Chattanooga Chapter.**

● distributes annually through chapters and by mail to secondary school students, thousands of leaflets entitled "Does Engineering Appeal to You".

Explains How Inclusions Are Formed in Steels at Fort Wayne Meeting

Speaker: Walter Crafts
Metals Research Laboratories

Walter Crafts, associate director of research, Metals Research Laboratories, Electro Metallurgical Co., a division of Union Carbide and Carbon Corp., and A.S.M. trustee, spoke on "Inclusion Formation in Steel" at **Fort Wayne's** National Officer's Night meeting.

Mr. Crafts explained the A.S.M.'s educational program and its plans for the future, and gave dates and places of meetings A.S.M. has planned for the next year.

Mr. Crafts pointed out that inclusions present a real problem in developing serviceability of metals. He classified the types of inclusions as "wild" and "domesticated". The "wild" type are more or less accidental in character and are controllable to a large degree. They result from bottom boils and ladle conditions that produce refractory and slag enclosures that tend to remain in the metal, especially in cold heats, through mechanical erosion and chemical reaction. The "domesticated" type of inclusions are formed from oxygen, sulfur and nitrogen dissolved in the liquid metal. The manner in which they are rejected during cooling controls their shape and effect on the steel, as in the case in which intergranular inclusions produce metals with low ductility.

Mr. Crafts explained that the type of inclusion can be controlled. Oxide precipitation is controlled by using manganese or silicon with the addition of such elements as aluminum. The use of controlling agents gives the metal a particular characteristic. Examples of controlling agents and their effect are sulfur giving better machining qualities, aluminum refining grain structure and manganese producing better rolling qualities. The effectiveness of these additions for controlling inclusions and related characteristics, such as hot working properties, depends largely on the sequence of de-oxidation treatments. These practices are largely empirical and peculiar to local and special conditions so that inclusion elimination requires meticulous and continuous attention.

Mr. Crafts' instructive talk was followed by a question and answer period. Following this a film, "Steel With a Thousand Qualities", was shown.—**Reported by Lee Van Fossen for Fort Wayne.**

Tells How Alloys Solidify

Speaker: C. W. Winegard
University of Toronto

At a meeting of the **Ontario Chapter** held in Hamilton in October, C. W. Winegard, assistant professor, department of metallurgy, University of Toronto, addressed the members on the subject "Solidification of Alloys". Dr. Winegard, who is currently investigating the segregation of impurities during solidification and annealing of metals, gave a most interesting and informative talk enjoyed by all members present.—**Reported by G. H. McCally for Ontario.**

● has fathered the establishment of *Acta Metallurgica*, technical and theoretical international publication for the entire metals industry.

Appointments to A.S.M. Standing Committees

At the meeting of the Board of Trustees of the American Society for Metals held Aug. 26, new appointments to various national committees of the Society were announced by President-Elect Roberts and confirmed by the Board. The complete personnel of the standing committees is listed below. The new appointments are shown in italics and the numerals represent the date of expiration of the appointment. Chapter affiliations are listed rather than employment addresses.

Constitution and By-Laws Committee

D. W. Thompson, General Electric Co., Fort Wayne, '55, Chairman.
T. M. La Crone, Lindberg Engineering Co., West Michigan, '55.
W. Mack Crook, Consulting Engineer, Texas, '56.
R. E. Layton, O. A. Sutton Corp., Wichita, '56.
M. E. Huether, Revere Copper & Brass Inc., St. Louis, '57.
G. M. Snyder, Northeast Pennsylvania, '57.
A. O. Schaefer, Midvale Co., Representative of Board of Trustees, Philadelphia.

Finance Committee

W. A. Pennington, Carrier Corp., Syracuse, '55, Chairman (A.S.M. Treasurer).
K. R. Van Horn, Aluminum Co. of America Research Laboratories, Pittsburgh, '55.
C. E. Williams, Battelle Memorial Institute, Columbus, '55.
A. B. Kinzel, Union Carbide & Carbon Research Laboratory, Inc., New York, '56.
A. A. Hess, American Society for Metals, Assistant Treasurer, Cleveland, '56.
F. R. Morral, Kaiser Aluminum & Chemical Corp., Inland Empire, '56.
R. P. Daykin, Ladish Co., Milwaukee, '57.
Zay Jeffries, General Electric Co., Cleveland, '57.
Erith Clayton, Tainton Co., Baltimore, '57.

Publications Committee

Peter Payson, Crucible Steel Co. of America, New York, '55, Chairman.
B. L. Averbach, Massachusetts Institute of Technology, Boston, '55.
W. O. Binder, Electro Metallurgical Co., Buffalo, '55.
J. A. Berger, Molybdenum Corp. of America, Pittsburgh, '55.
J. L. Gregg, Cornell University, Southern Tier, '55.
G. V. Smith. U. S. Steel Corp., New Jersey, '55.
H. S. Avery, American Brake Shoe Co., New York, '56.
D. J. Carney, U. S. Steel Corp., Chicago, '56.
James Wyatt, Horizons, Inc., Cleveland, '56.
W. D. Manly, Oak Ridge National Laboratory, Oak Ridge, '56.
G. W. Birdsall, Reynolds Metals Co., Louisville, '57.
H. J. Elmendorf, American Steel & Wire Co., Worcester, '57.
G. A. Fritzlen, Haynes Stellite Co., Purdue, '57.
J. F. Libsch, Lehigh University, Lehigh Valley, '57.
R. I. Jaffee, Battelle Memorial Institute, Columbus, '57.
R. D. Chapman, Chrysler Corp., Detroit, '56.

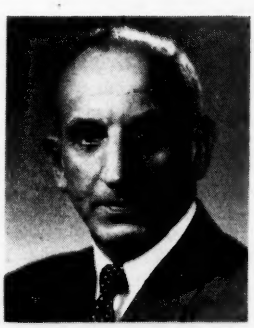
Advisory Committee on Metallurgical Education

W. E. Mahin, Vanadium Corp. of America, '55, Chairman.
Frank Forward, University of British Columbia, British Columbia, '55.
J. C. Holmberg, Douglas Aircraft Co., Tulsa, '55.
A. J. Shaler, Pennsylvania State College, Penn State, '55.
G. A. Fisher, Jr., International Nickel Co., St. Louis, '56.
H. E. Flanders, University of Utah, Utah, '56.

(Continued on following page)

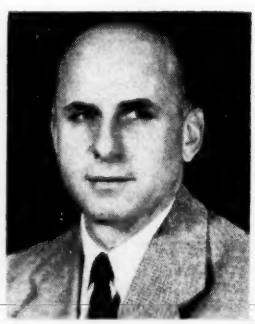
W. E. Mahin

These Men Are the Newly Appointed Chairmen of the Following A.S.M. Standing Committees: W. E. Mahin, Advisory Committee on Metallurgical Education; D. W. Thompson, Constitution and By-Laws Committee; O. T. Marzke, Seminar Committee; N. E. Promisel, Metals Handbook Committee; P. Payson, Publications Committee; and C. H. Lorig, Education Committee



C. H. Lorig

D. W. Thompson



O. T. Marzke

N. E Promisel

Peter Payson

E. E. Stansbury, University of Tennessee, Oak Ridge, '56.
R. F. Hehemann, Case Institute of Technology, Cleveland, '57.
J. W. Ludewig, Carnegie Institute of Technology, Pittsburgh, '57.
James U. MacEwan, McGill University, Montreal, '57.
Robert Raudebaugh, A.S.M. Trustee, Representative of the Board.

Education Committee

C. H. Lorig, Battelle Memorial Institute, Columbus, '55, Chairman.
W. J. Buechling, Copperweld Steel Co., Warren, '55.
J. M. Edge, Tennessee Coal Iron & R. R. Co., Birmingham, '55.
R. S. Guinan, Development Engineer, Rochester, '56.
H. J. Smith, International Harvester Co., Louisville, '56.
Morris Cohen, Massachusetts Institute of Technology, Boston, '57.
W. T. Lankford, Jr., U. S. Steel Corp., Pittsburgh, '57.
M. R. Meyerson, National Bureau of Standards, Washington, '57.
A. U. Seybolt, General Electric Co., Eastern New York, '57.

Metal Progress Advisory Committee

E. E. Thum, Editor, *Metal Progress*, Cleveland.
G. A. Roberts, President, A.S.M.
A. O. Schaefer, Vice-President, A.S.M.
W. H. Eisenman, Secretary, A.S.M.
J. L. Christie, Handy & Harman, New Haven, '55.
R. G. Roshong, Heintz Manufacturing Co., Philadelphia, '55.
F. G. Foote, Argonne National Laboratory, Chicago, '56.
H. J. Nichols, Bureau of Mines and Technical Surveys, Ottawa Valley, '57.
Donald Rosenblatt, Elmco Corp., Utah, '57.
L. P. Tarasov, Norton Co., Worcester, '57.

Metals Handbook Committee

N. E. Promisel, Navy Bureau of Aeronautics, Washington, '55, Chairman.
L. E. Simon, Electro-Motive Division, Chicago, '55.
S. F. Urban, Titanium Alloy Manufacturing Co., Buffalo, '56.
F. R. Anderson, Gardner-Denver Co., Rocky Mountain, '56.
W. L. Badger, General Electric Co., Boston, '56.
R. W. E. Leiter, Budd Co., Philadelphia, '57.
M. L. Frey, Allis-Chalmers Manufacturing Co., '57.
S. R. Callaway, General Motors Corp., Detroit, '57.
T. A. Frischman, Eaton Manufacturing Co., Cleveland, '57.
George Perkins, Reynolds Metals Co., Louisville, '57.
C. W. Briggs, Steel Founders' Society of America, '57.
A. R. Oakley, Steel & Machine Tool Sales Co., Texas, '57.

Vocational Education Committee

W. F. Collins, United Carr Fastener Corp., Boston, '55, Chairman.
Alfred Bornemann, Stevens Institute of Technology, New Jersey, '55.
H. N. Farmer, Security Engineering Co., Inc., Los Angeles, '55.
W. J. Kinderman, Yarnall-Waring Co., Philadelphia, '55.
F. J. Robbins, Sierra Drawn Steel Corp., Los Angeles, '55.
W. C. Schulte, Curtiss-Wright Corp., New Jersey, '55.
T. J. Hugel, Purdue University, Purdue, '56.
Karl Fetters, Representative of the Board of Trustees.
W. E. Mahin, Chairman, Advisory Committee for Metallurgical Education (ex officio).
O. E. Cullen, Surface Combustion Corp., Toledo, '57.
A. R. Fairchild, Jr., Western Electric Co., Carolinas, '57.
W. E. Frank, Caterpillar Tractor Co., Peoria, '57.
Jacob G. Gantner, National Cash Register Co., Dayton, '57.
M. J. Weldon, Henry G. Thompson & Son Co., New Haven, '57.

Seminar Committee

O. T. Marzke, Naval Research Laboratory, Washington, '55, Chairman.
P. A. Beck, University of Illinois, Peoria, '55.
E. S. Machlin, Columbia University, New York, '55.
Frederick Seitz, University of Illinois, '55.
R. L. Cunningham, Canadian Bureau of Mines, Ottawa Valley, '56.
Eric Jette, Los Alamos Scientific Laboratory, Los Alamos, '56.
Robert Maddin, Johns Hopkins University, Baltimore, '56.
Arthur S. Nowick, Yale University, New Haven, '56.
B. Averbach, Massachusetts Institute of Technology, Boston, '57.
Bruce Chalmers, Harvard University, Boston, '57.
John Fischer, General Electric Research Laboratory, Eastern New York, '57.
T. Read, Jr., Bell Telephone Laboratory, New Jersey, '57.

Metals for Jet Engines Discussed at Phoenix

Speaker: L. A. Lunini
Curtiss Wright Corp.

L. A. Lunini, Wright Aeronautical Division, Curtiss Wright Corp., presented a talk entitled "New Metals That Are Being Used in Jet Engines of Today" at a meeting of the **Phoenix Area Chapter** recently. Mr. Lunini was assisted in his talk by Emil Osol, also of Curtiss Wright, and together they gave a comprehensive review of the metals that are being used in the construction of the jet engine.—**Reported by D. A. Rich for Phoenix Area.**

Presents Data on Process for the Cold Extrusion of Steel

Speaker: Ben Kaul
Mullins Mfg. Co.

The **Calumet Chapter** heard Ben Kaul, director of technical development for Mullins Manufacturing Co. and originator of the company's Koldflo Process, talk on "Cold Extrusion of Steel".

Mr. Kaul presented a brief history of steel forging and discussed advantages in the use of the hydraulic press for cold extrusion of steel on long parts. The hydraulic press produces maximum pressure on the full length of stroke available. He then explained the various steps necessary for a finished extrusion.

Sections are first cut from rolled bar stock and made into completely round slugs by means of a die in a press. The slugs are sized, phosphate coated and then extruded. The length of backward extrusion possible is generally twice the diameter of the punch, the limiting factor being the strength of toolsteel in the dies and available pressure. The working limit is about Rockwell B-102 on extruded articles and, if further shaping is necessary, the part must be stress relieved.

Die life is excellent. A lubricant (phosphate coating) is provided on each slug. The proper die design will prevent the steel from galling. Temperature of parts or dies properly designed does not exceed 350° F., regardless of the number produced per hour.

Mr. Kaul discussed the economics of the cold extrusion process and stated that the balance between labor costs and the cost of steel and its savings over previous methods was the determining factor. A cold extruded finished article provides very close tolerances. Low carbon steels are well suited for this process, and physical properties of approximately 100,000 psi. are created by cold working. Alloy steels may be extruded, but the annealing or stress-relieving necessary to complete a multiple-operation article restricts the use of alloy steel to parts made in one shot.

A perfectly round hole can now be produced, which opens a large field of commercial use. Although the biggest advance has been made in the extrusion of military items, commercial articles, such as accumulators for power steering, power brakes and other articles, are now being extruded. Wherever the physical properties obtained by cold working are satisfactory for a part, labor and material can be saved over previous methods.

Appropriate sketches and extruded parts were used to emphasize steps in the extrusion procedure.—**Reported by C. A. Michaels for Calumet.**

NE Pennsylvania Hears Raudebaugh

Northeast Pennsylvania Chapter Chairman, L. P. Clare, Sylvania Electric Products, Inc., Presents a Sustaining Membership Certificate to D. J. Branning (Right) Who Represents the Hygrade Atlas Co., the Chapter's First Sustaining Member. The ceremony took place during the Chapter's National Officers Night Meeting at which Robert J. Raudebaugh, A.S.M. Trustee, Gave a Talk Entitled "Some Recent Metallurgical Developments"

Speaker: R. J. Raudebaugh
International Nickel Co.

At the National Officers' Night meeting of the **Northeast Pennsylvania Chapter, R. J. Raudebaugh**, of **International Nickel Co.'s Research Laboratories, presented a talk on "Recent Metallurgical Developments".**

Dr. Raudebaugh commented on the progress made in the development of America's extensive taconite iron ores. Blast furnaces have already been operated successfully on a 100% beneficiated taconite charge. Other new sources of iron ore which recently have been developed are those of Labrador and Venezuela, both of which contain about 60% iron.

The recovery of manganese from openhearth furnace slags is being accomplished by smelting, leaching and chemical processes. Some development remains to be done to effect an economical recovery of the metal by these processes. These slags can, however, provide all the manganese our steel industry requires.

Vacuum melting techniques for such highly reactive metals as titanium, strontium and beryllium have graduated from the laboratory stage and are being used in industry on a larger scale to melt these metals and many alloys.

In the physical metallurgy field, a new adaptation of the electron microscope enables viewing in the third dimension and is expected to answer some intriguing questions. Work continues on alloys for high-temperature applications, with creep, creep-rupture and stress-rupture tests being used to determine the suitability of the alloys. In addition, progress has been made in the development of ceramic and metal-ceramic coatings to protect these alloys against high-temperature oxidation.—**Reported by A. J. Babecki for Northeast Pennsylvania.**

Growth and Future Of Aluminum Noted

Speaker: Charles Braglio
Aluminum Co. of America

The **Columbus Chapter** initiated its 1954-55 season with a talk on "Aluminum—New Developments and Future Prospects" presented by Charles Braglio, assistant manager, development division, Aluminum Co. of America. Mr. Braglio discussed the availability, demand and economic advantages of aluminum.

The present supply of primary aluminum was traced from the first commercial production in 1888 to the current U. S. production of an estimated 1,500,000 tons in 1954. Last year the production of secondary aluminum in this country set a new high in tonnage with 368,000 tons. In addition, the aluminum supply last year was augmented by imports from Canada amounting to 250,000 tons. In describing the current expansion programs of the various U. S. and Canadian producers, he emphasized that Aluminum Co. of Canada, Ltd., alone, will produce 1,050,000 tons annually with the completion of its Kitimat project. Mr. Braglio predicted a five-fold increase over 1950 production by 1975.

The speaker pointed out that the only reason for designing with aluminum or for engineering it into a design is its economic advantages. This discussion was centered around a list of the fundamental characteristics possessed by aluminum: light weight, high resistance to corrosion, high electrical conductivity, high thermal conductivity, high reflectivity (85% of visible light is reflected), workability, nontoxic nature, nonsparking characteristics, nonmagnetic nature, strength attained by alloys, appearance and high scrap value. The speaker stated that the most important characteristic of aluminum is its light weight, about one-third that of steel. Although the volume conductivity of the electrical-conductor grade of aluminum is only 61% that of the copper standard, its mass conductivity is 200%. In commenting on the strength produced in aluminum when it is alloyed, the speaker deemed it unfortunate that aluminum when alloyed is still called plain aluminum while, for example, copper becomes red brass, manganese bronze, etc., when alloyed.

Some 20 to 25% of the current aluminum production is being used in the building products field. The 30-story Alcoa office building in Pittsburgh, the first light-weight skyscraper, points the way to additional applications in this field. Both office and industrial buildings designed to use aluminum walls are more economical to build than those of conventional brick construction. In addition, the thinner walls give more floor space, an important factor in rented offices. The additional space created in the 30-story Alcoa building by this new wall construction is the equivalent of one extra floor. Seventy-one buildings with aluminum wall construction are now in the planning stage or beyond.

In the discussion period which followed the talk, the speaker pointed out that aluminum is competitive with steel in bridge construction in this country only where the weight factor is unusually important. Aluminum is economically employed in lift bridges and in certain existing bridges, the useful life of which may be prolonged by a reduction in dead weight. More aluminum is used in structural applications in Europe than in this country because steel is more costly in proportion there than here. The potential use of aluminum coatings on ferrous materials, such as steel wire and sheet and cast iron and malleable iron stove parts, is very large. Certain applications even require aluminum-dipped stainless steel.—**Reported by Ellis Fletcher for Columbus Chapter.**

Machinability Talk at Akron

Speaker: F. W. Boulger
Battelle Memorial Institute

The **Akron Chapter** heard Francis W. Boulger, chief, division of ferrous metallurgy, Battelle Memorial Institute, present a lecture on the "Metallurgical Aspects of Machinability" at a recent meeting.

Mr. Boulger, who has worked on many aspects of steel production, including the chemical properties of coke as they affect blast furnaces, the deoxidation of steel, the effects of gases on the properties of steel and the cold pressing and cold drawing of steels, delivered a most interesting and informative lecture.

Describes Metals For Use in Nuclear Energy Applications

Speakers: E. J. Boyle and J. M. Warde
Oak Ridge National Laboratory

Special problems inherent in nuclear engineering were discussed at a meeting of the **Baltimore Chapter** by E. J. Boyle, assistant director, metallurgical division, Oak Ridge National Laboratory, speaking on "Metals in Nuclear Energy", and J. M. Warde, head of ceramics laboratory, metallurgical division, Oak Ridge National Laboratory, whose subject was "Ceramics in Nuclear Energy".

Mr. Boyle reviewed some of the basic aspects of nuclear technology. One of the most important considerations in choice of materials relates to the great difference in neutron absorption of the individual metals. The measure of this parasitic capture by a material is known as its "cross section" and is expressed in "barns".

Materials problems are one of the major difficulties associated with the development of nuclear reactors. Many of these problems are the same as those associated with construction of any machine for use at elevated temperatures, but the additional variables associated with a nuclear chain-reacting system impose some special problems.

Corrosion is one of the most important problems. Uranium, for example, being a very active material, must be protected from the reactor coolant by a cladding material. Aluminum is employed almost exclusively for reactors operating at low temperature because of its low nuclear cross section, corrosion resistance and fabricability.

In the choice of moderator materials, the cross-section characteristic is of primary importance. Carbon, hydrogen, beryllium and deuterium are the materials most often used. Hydrogen and deuterium are used in the form of light and heavy water, while graphite is the unusual form for a carbon moderator. Beryllium is very effective both as metal and as oxide and has adequate corrosion resistance in low-temperature water for use without protective cladding. However, beryllium shapes are difficult to fabricate and the cost is extremely high.

Choice of structural materials is dictated by operating temperature of the reactors. In low-temperature reactors, aluminum is used almost exclusively. Magnesium has been seriously considered but its corrosion resistance is poor. In the intermediate temperature range (100 to 300° C.), zirconium, titanium and the stainless steels are most commonly employed. Zirconium has the important advantage of low nuclear cross section, but is expensive. In reactors designed for breeding, zirconium is practically a necessity in the active core, since it absorbs so few neutrons.

For high-temperature reactors, stainless steels, nickel-base alloys, molybdenum and columbium are the primary choices. Molybdenum and columbium have poor oxidation resistance and must be clad with a resistant alloy when used in air.

Following Mr. Boyle's discussion, Dr. Warde presented some of the advantages and limitations of ceramics for similar use. For this purpose, ceramics were defined as inorganic nonmetallic solids capable of use at elevated temperatures. They include special refractories, pure oxides, borides, nitrides and silicides, and the cermet combinations of metals and special refractories. The major advantages of such materials are their higher working temperatures and better oxidation resistance, coupled with low nuclear cross section. Among the disadvantages are poor ductility, thermal shock resistance and electrical conductivity.

Many of the newer ceramic materials for reactor service were virtually unknown prior to World War II, and are the result of intensive research on materials for nuclear energy applications, jet engines, guided missiles and other high-temperature equipment. Ceramics have also been employed with considerable success as container materials in processing metals used in reactor technology.—**Reported by J. E. Cutcliffe for Baltimore.**

Speaks on Pipe Line Design at Tulsa

Members of the Tulsa Chapter Heard H. Maurice Banta of Battelle Memorial Institute Speak on "Metallurgical Problems Associated With the Design and Construction of Gas Transmission Pipe Lines" at a Recent Meeting. In the photograph are, from left: Paul Ogden, Vice-Chairman; Mr. Banta; and George E. Sykora, Tulsa Chairman. (Photo by J. C. Holmberg)

Reviews Metallurgy and Uses for Refractories

Speaker: R. A. Witschey
A. P. Green Firebrick Co.

At a meeting of the **Canton-Massillon Chapter** an address on "Refractories" was given by R. A. Witschey, ceramics engineer with the A. P. Green Firebrick Co.

In his introduction, the speaker stressed the need for a fundamental approach to the problem of selecting refractories for a given application. He pointed out that the various refractories should be referred to by generic definition rather than by brand names.

The classification of refractories according to chemical composition, mineralogical designation and physical form was described. The speaker noted that refractories of the same composition chemically may be quite different in their performance, depending upon their physical form. The influence of particle size on the value obtained for the pyrometric cone equivalent of a given chemical composition was discussed to illustrate this point.

The use of A.S.T.M. standard tests for determining mechanical and thermal properties of refractories was strongly urged. Selection of refractories for specific purposes was discussed and illustrated by slides.

Monolithic refractories, plastic or castable, were described in detail, and the use of steel and refractory anchors essential to the application of monolithic refractories in furnace roofs and walls was presented with illustrations. The relatively recent development of gun-applied refractories was described and its limitations noted.—**Reported by W. E. Littmann for Canton-Massillon Chapter.**

Metallurgical News and Developments

Devoted to News in the Metals Field of Special Interest to Students and Others

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Fellowship—Electro Metallurgical Co. has renewed a $5000 grant to Iowa State College to support a research fellowship in the field of basic metallurgy.

Casting Clinic—Federated Metals Division, American Smelting and Refining Co., plans to hold nonferrous metals casting clinics in various parts of the country, to bring the latest technical information on casting within reach of the foundryman. The clinics will be based on the first very successful clinic held at its New Jersey Laboratories recently.

Colombia Aluminum — Reynolds Metals Co., W. R. Grace & Co., and J. Mario Santo Domingo, industrialist from Colombia, S. A., have entered into an agreement to form a company in South America to manufacture aluminum products to supply the Colombian market with sheet, foil, extrusions and various other aluminum products.

Uranium Mining — Vitro Corp. of America, oldest continuing company active in atomic energy, has acquired an interest in several uranium claims in Wyoming, and has started exploration and drilling in preparation for mining of ore.

Plant Expansion—Kaiser Aluminum & Chemical is currently undergoing a $27-million, three-year expansion program at its Baton Rouge, La., plant to raise its capacity to over 800,000 tons of alumina per year. The addition will include facilities for processing bauxite from the company's recently developed mines in Jamaica, British West Indies.

Steel Foundry—Dominion Foundries and Steel Ltd., is operating its oxygen steelmaking plant, the first one outside of Austria, where the process was invented. Capacity at Dominion is 1000 ingot tons a day.

Lower Price—DuPont has announced a $50 per lb. cut in the price of high-purity silicon, reflecting the growing demand by the electronics industry for this semiconductor.

Vacuum Furnace—F. J. Stokes Machine Co. has developed a new vacuum melting and casting furnace suitable for moderate-size production of high-purity metals or for experimental and pilot-scale work.

Radioactive Al—A long-lived radioactive isotope of aluminum has recently been discovered by Carnegie Institute of Technology chemists. Previously, isotopes of aluminum had lifetimes of a few minutes and were not suitable for tracer experiments. The new isotope, Aluminum 26, has a half life of about one million years.

Cutting Torch—A cutting torch that slides through steel with a 5500°F. flame has been developed by Worcester Taper Pin Co. The torch, which is faster and more economical than conventional types, uses gasoline or naphtha instead of gas.

Steel Tube—Jones & Laughlin has started production of a high-strength steel tube for the oil industry. Tubes with from 80,000 to 110,000 psi. tensile strength are being turned out.

Change Quarters — Drever Co., formerly in Philadelphia, has moved its offices and plant to Bethayres, Pa., in order to handle increased inquiries and work for customers.

Consultants—Dan White and Associates have set up a consulting office in Rocky River, Ohio, to handle specialized work for the metallurgy, welding and related industries.

Research Furnace—Naresco Equipment Co. has announced a new 30-lb. induction-heated vacuum furnace, available with either a vertical or horizontal shell, for research and development purposes. It features coaxial power feed-through and means for adding additional charge or alloying material during melting without losing the vacuum.

Nickel-Plating Plant—American Locomotive Co. has opened industry's largest capacity plant for the commercial application of its chemical nickel-plating process, known as Alcoplate. This process promises significant savings to chemical, petroleum, power and other process companies which are troubled with contamination in their production cycles.

Student Receives Scientific Award

Stanley Matyszewski (Left), Fairfield University Student and a June Graduate of Fairfield Preparatory School, Received a $50 Award, Lapel Button and Certificate of Award From Carl B. Christianson, Ex Officio Executive Committee Member, New Haven Chapter, as the Third Place Winner in the National Competition for Science Achievement Awards for Students Sponsored by A. S. M. Mr. Matyszewski received the award for his project entitled "Measurement of Reduction Potentials". Reverend Francis X. Carty, S. J., principal of Fairfield Prep, received a plaque for the school. (Reported by E. W. Lovering for the New Haven Chapter)

Summarizes Metal Cutting Techniques At Springfield

Speaker: Lester Sheehan

Jones & Lamson Machine Co.

Speaking before the **Springfield Chapter,** Lester Sheehan, chief metallurgist at Jones & Lamson Machine Co., traced "Past Developments and Recent Research in Metal Cutting".

Mr. Sheehan pointed out that in 1865, with water-hardening toolsteels, cutting speeds of 16 ft. per min. were common. By 1906, high speed steel tools had been developed, making possible cutting speeds of 60 ft. per min., and as high as 100 ft. per min. on free machining materials. Today, although cutting speeds of 350 ft. per min. are common with carbide cutting tools, research engineers at Jones & Lamson have developed equipment bringing cutting speeds up to 1400 ft. per min. into the realm of practicability.

L. Sheehan

The problem of high speed cutting was attacked, Mr. Sheehan stated, from several vantage points. Radial, tangential and feed loads were measured by application of SR-4 gages to a special tool dynamometer developed at Jones & Lamson. In addition, motion pictures were made at speeds up to 3000 frames per sec. Photomicrographs were made of sections of the workpieces to study depth of plastic deformation and quality of surface finish. Measurements of loads and the wear land developed on the tool were made and plotted against square inches of surface of metal machined. When a 50% overload was developed, the wear point was arbitrarily assumed to have been reached. Effects of tool geometry and coolants were also investigated. All investigations were carried out on turning operations only.

Among the important conclusions reported by Mr. Sheehan were the following:

1. At high cutting speeds, carbide tools are less sensitive to variations in the work material than are the high speed tools.

2. Steels of the same carbon content when heat treated to the same structure perform similarly when cut.

3. Varying the top rake angle from +5 to −5° improves tool life but results in great tool forces.

4. Higher speeds of cutting, up to a point (about 600 ft. per min. in the example cited), produced a marked improvement in surface finish, and a decrease in the depth of inelastic deformation in the work pieces. For instance, in one case, subsurface distortion decreased from 0.006 in. at 100 ft. per min. to 0.001 in. at 600 ft. per min. Finish often improves so as to eliminate the need for additional finishing operations.

5. The tendency toward welding and formation of built-up edges is eliminated in both low and high carbon steels at high speeds.

6. Dual-jet coolant techniques utilizing 15 to 25 psi. are necessary for high-speed cutting, particularly at speeds over 250 ft. per min.

7. For successful application of the technique carefully supervised central tool grinding is needed.

From a practical standpoint, one of the problems encountered in the introduction of higher speed equipment into a plant is operator fatigue and response. This has been overcome by the introduction of power to feeds, cross slides, etc.

Mr. Sheehan illustrated his talk with slides and an excellent sound movie made by Jones & Lamson, showing in color the metal cutting techniques used and results obtained. **—Reported by C. A. Keyser for Springfield Chapter.**

Presents Status of Nuclear Technology

Speaker: W. D. Manly

Oak Ridge National Laboratory

Speaking before the first regular meeting of the 1954-55 season at the **Cincinnati Chapter,** William D. Manly, metallurgist, Oak Ridge National Laboratories, gave a talk on "Reactor Materials and Technology".

Mr. Manly pointed out the great strides made in nuclear reactors from the original pile under the West Stands at Stagg Field to the present. Whereas the first pile produced 200 watts, today's reactors are discussed in terms of megawatts. Further progress was illustrated by the fact that there are now approximately 25 reactors in operation, 10 in the proposal stage and about 10 other countries with active interests in reactors.

The present five-year plan to foster and implement the development of power reactors was discussed. This plan calls for the construction of nuclear reactors including the pressured water-cooled reactor being built under a joint contract between Westinghouse and Duquesne Light Co., a boiling water reactor to generate 5000 kilowatts of electric power, a large version of the present homogeneous reactor, a breeder reactor of intermediate size (15,000 kilowatts of electric power) and a reactor to generate about 20,000 kilowatts of heat by utilizing sodium as a coolant and graphite as a moderator.

The six basic parts of a reactor, their function and relationships, both nuclear and metallurgical, were fully described. By the use of slides, materials were shown which are acceptable to fulfill the requirements of fuels, coolants, shields, moderators, controls and structural parts. It was pointed out that, in many cases, the final selection is a compromise between properties, cost and nuclear requirements.

A discussion and colored slides of the X-10 graphite reactor at Oak Ridge were also presented. This declassified reactor has been in continuous use for a number of years. It utilizes normal uranium canned into aluminum slugs approximately 1 in. in diameter by 4 in. long. Moderation is accomplished by graphite and cooling is by air. Control of the neutron density is achieved by boron-steel rods and there is approximately 7 ft. of concrete shielding to protect the operating personnel.

To show the line of reasoning and the solution of metallurgical problems encountered in building reactors, Mr. Manly designed a hypothetical reactor for an automobile. Materials for the six basic parts were discussed separately and in conjunction with each other. The final design consisted of a gas turbine with two heat exchanges, a primary and a secondary. The reactor portion of the power plant might consist of a nickel structure with normal uranium fuel, moderated by an inorganic hydrogenous material, cooled with a liquid metal, controlled by rods containing boron-bearing slugs, shielded by lead and water.—**Reported by G. F. Baumann for Cincinnati.**

OBITUARIES

RICHARD H. PATCH, vice-president, operations, E. F. Houghton & Co., died in Hot Springs, Ark., in November. He had been with Houghton since 1926 and was a plant official at the Midvale Co. prior to that time.

Dr. Patch held A.B. and Ph.D. degrees from Harvard University. He was a past chairman of the Philadelphia Chapter A.S.M., a member of Houghton's board of directors, executive vice-president of E. F. Houghton & Co. of Canada, Ltd., and treasurer of the Houghton Vix-Syn Co.

TOM WINTERTON, Latrobe Steel Co., died suddenly in November. Mr. Winterton, a graduate of Duquesne University, was with U. S. Steel Corp. from 1928 to 1951, and was employed by Latrobe as manager of advertising and sales promotion from 1951 to the time of his death.

F. E. REJALL, vice-president and general manager, Pilot Steel & Tool Co. Ltd., passed away in October at the age of 72. Mr. Rejall was a member of the Montreal Chapter.

WILLIAM ADAM, JR., president of Ajax Electric Co., and Philadelphia Chapter member, died in November.

Molding Process Panel at Joint Meeting

A Panel of Experts Presented a Discussion of "Newest Molding Techniques" at a Joint Meeting of the Minnesota Chapter A.S.M. and the Twin City Chapter A.F.S. Shown are, from left, A. W. Johnson, chairman of the A.F.S. Chapter, accepting a molder's bench-rammer from Andreas Luksch, A.S.M. chairman, a gift presented in appreciation for the gavel presented to the A.S.M. Chapter in last year's joint meeting by the A.F.S. Chapter

A joint meeting of the **Minnesota Chapter** and the Twin City Chapter of the American Foundrymen's Society featured a panel discussion on the "Newest Molding Techniques". Panel members were: F. S. Brewster, vice-president and general manager of the H. W. Dietert Co.; R. W. Heine, associate professor, department of mining and metallurgy, University of Wisconsin; and L. J. Pedicini, project engineer, process development section, Cadillac Division, General Motors Corp.

The panel was introduced by O. Jay Myers, technical director, Archer-Daniels-Midland Co. The speakers reviewed the latest advances in the Croning and Dietert pressure molding processes, as well as the techniques and modifications of the processes practiced by shops actually using them in production.

An interesting application of Croning process molding was presented by L. J. Pedicini who discussed the casting of high replacement parts in the toolroom. In his shop, a regular shell molding system was set up in the toolroom. Mr. Pedicini pointed out that, actually, the establishment of a shell molding line involves a relatively low capital investment as compared with a green sand molding line.

Mr. Brewster, speaking on the Dietert process, contended that its applications and benefits were identical with those of the Croning process, but had the further advantage of lower initial set-up cost.

The pressure process, described by Mr. Heine, is claimed to have benefits in finish and tolerance limits comparable to those of both the other processes. The major deterrent in its acceptance and application has been lack of suitable pressure equipment. However, such molding equipment is now being marketed and with increasing production, decreasing costs will come. One of the major benefits of this process is that once the initial set-up has been made, the entire shop can use it, since the only limiting factor in its application is availability of proper equipment.

A molder's bench-rammer was presented by Minnesota Chapter to the Twin City Chapter A.F.S. in appreciation of the gavel received by the A.S.M. Chapter at last year's joint meeting.—**Reported by L. D. Gutsche for Minnesota.**

Speaks on Fatigue Damage and Testing

Speaker: T. J. Dolan
University of Illinois

At a recent meeting of the **Notre Dame Chapter,** T. J. Dolan, head of the department of theoretical and applied mechanics at the University of Illinois, gave a talk on "Fatigue Damage in Metals".

Prof. Dolan's talk illustrated the basic mechanism of progressive fracture. He explained that fatigue damage takes place in three steps: Localized work hardening in the metal; formation and growth of microscopic cracks; and growth of visible cracks and final fracture.

He explained that the grain size of single-phase metals has a definite effect on fatigue life. The smaller grain size results in improved fatigue strength. For more complex metals such as steel, structures with well dispersed carbides are to be preferred.

At the University of Illinois, extensive fatigue life tests have been run and it has been found that the fatigue life of a given part cannot be accurately predicted as a design criterion. Prof. Dolan explained that the scatter band is too great in most instances; with extensive test data, however, the ***probability*** of failure after a given life can be predicted.

Prof. Dolan brought out that, in design, fretting corrosion is often a cause of failure, even though the stresses are at a very low level.

According to Prof. Dolan, the greatest gains in fatigue life could be made by proper design and fabrication of parts and components. Minor changes in contour, surface processing, heat treatment, etc., are more effective in curing chronic cases of fatigue failure than can be expected from changes in material or alloy content.—**Reported by R. C. Pocock for Notre Dame Chapter.**

Saginaw Valley Chapter Officers

Officers of the Saginaw Valley Chapter for the 1954-55 Season Include, From Left: H. R. Wegner, Vice-Chairman; R. S. Haverberg, Chairman; and T. E. Leontis, Secretary-Treasurer. (Photograph from A. S. Dryden)

Compliments

To the JACKSONVILLE CHAPTER on its 365% increase in membership over last year's membership.

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To the METALLOGRAPHIC STAFF of the South Works Research Laboratory of United States Steel Corp., Chicago, on winning three "Best in Class" awards in the A.S.M. Metallographic Exhibit held during the recent National Metal Congress—namely, in the classifications on "Stainless Steels and Heat Resisting Alloys", "Carbon and Alloy Steels", and "Slag, Inclusions, Refractories and Cermets". (see p. 8).

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To MRS. STEPHANIE HACKLAENDER of C. C. Kawin Co., Chicago, on winning four awards in the Metallographic Exhibit—namely, "Best in Class" in the classification on "Iron, Cast and Wrought", and "Honorable Mention" in the classes on "Iron, Cast and Wrought", "Carbon and Alloy Steels", and "Welds and Other Joining Methods".

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To F. P. ZIMMERLI on his appointment to director of engineering and research for the Associated Spring Corp. Mr. Zimmerli has served as secretary, vice-chairman and chairman of the Detroit Chapter and received the A.S.M. Sauveur Award in 1947. He was formerly chief engineer of the Barnes-Gibson-Raymond Division of Associated Spring.

Increasing Markets for Aluminum Predicted

Speaker: John R. Willard

Aluminum Co. of America

John R. Willard, sales development division, Aluminum Co. of America, gave a talk before the **Rocky Mountain Chapter** on "New Developments in Aluminum".

Mr. Willard discussed the growth of the aluminum industry since the beginning of World War II, with particular emphasis on the way civilian markets have been expanded to absorb the war-time capacity. Consumption of aluminum has increased rapidly during the last few years—in 1953 over .2½ billion pounds were consumed—the estimate for 1954 is approximately 3¼ billion pounds.

New alloys of aluminum have been a big factor in the development of new uses in many fields. New and improved welding methods have been developed and other methods of fabrication have been improved. A wide selection of colors and finishes are now on the market, and the light weight and increasing tensile strength of aluminum is constantly creating new uses for this very important metal.—**Reported by H. J. Crim for Rocky Mountain-Denver.**

Presents Woodside Lecture At Detroit

Earle C. Smith, (Left), Guest Speaker at a Meeting of the Detroit Chapter, Is Shown Receiving the Woodside Memorial Lecture Certificate From H. N. Bosworth, Chapter Chairman. He presented a lecture on "Men and Metals"

Speaker: Earle C. Smith

Republic Steel Corp.

The 12th Annual William Park Woodside Lecture was presented in Detroit by Earle C. Smith, chief metallurgist, Republic Steel Corp. His lecture, "Men and Metals", followed a dinner meeting during which the Chapter's executive committee members were introduced and the history of the Woodside Lecture reviewed.

Mr. Smith presented several predictions for the state of the economy and the metal industry in 1980, at which time the population of the United States is expected to reach 175,000,000, with 72,000,000 employed. The output per man hour is expected to increase by 89% over the present output, and, although counteracted by an anticipated shorter work week, this is expected to raise the annual productivity of the United States to $415,000,000,000 by 1980, compared to the present $275,000,000,000. Steel capacity in 1892, in terms of pounds produced per capita per year, was 100 lb.; in 1950, 1400 lb.; by 1980 this should reach 1700 lb., or a total capacity of 150 million ingot tons. Mr. Smith predicted spectacular increases in aluminum, magnesium and titanium production, noting that this would occur in spite of the fact that the capital investment that makes possible the production of 1 lb. of titanium is now 1000 times that of an equivalent weight of steel. The use of these newer metals depends on improved and lower cost fabrication.

One of the important points made by Mr. Smith was that "people are more important than things; men are more important than metal". He elaborated on this by stating that present commercial metals would still be rarities if it were not for the perseverence of men. Men show the need, and men find the answer to the problem of making metals economically usable. Mr. Smith cited many examples in steelmaking, steel processing and in the uses of newer materials to support this contention.

Another important point made was the interrelation of basic research and productive progress. There is no set pattern for this relation; in most cases the basic ideas are not related to their eventual practical application. It takes the observant mind of the practical man, faced with his pressing problems, to take advantage of the principles revealed by basic research. In many cases also, the practical solution is found and much later the basic reasons for the solution are understood, as a result of careful and controlled research. The outcome of the interrelation in both cases is a more complete understanding of the nature of things. Mr. Smith paid tribute to W. P. Woodside as one of the minds quick to find the practical solution to vexing problems.

Among many excellent examples of his theme, Mr. Smith quoted an amusing one from the originator of stainless cutlery steels, Brearley, stating that he became famous for "inventing a stainless steel that sometimes rusts to produce cutlery that will not cut".

Mr. Smith wove into his talk many recollections of his early associations with "Bill" Woodside, whom he continually cited as an outstanding example that "men are more important than metals".—**Reported by D. V. Doane for Detroit Chapter.**

Talks on Nondestructive Testing

Gordon B. Baumeister (Right), Special Products Engineer, Magnaflux Corp., Presented a Talk Entitled "New Horizons in Nondestructive Testing" at a Recent Meeting of the North Texas Chapter. He is shown with, from left: J. P. Fowler, Chapter secretary, and John M. Turbitt, chairman. A full report of this talk appeared on p. 10 of the November issue of Metals Review. *(Reported by R. E. Hopper for the North Texas Chapter)*

Technology of Titanium Presented at Rome Chapter

Speaker: Robert I. Jaffee

Battelle Memorial Institute

The first meeting of the season of the **Rome Chapter** featured a talk on "Current Technology in Titanium Alloys" by Robert I. Jaffee, chief of nonferrous physical metallurgy division, Battelle Memorial Institute.

Due to the widening fields pertinent to titanium, the speaker confined his discussion to the properties of the titanium-interstitial, titanium-aluminum and titanium-manganese groups with particular emphasis on the various interstitial effects. The properties of high-purity titanium, which include excellent ductility but relatively low strengths, indicate the need for proper alloying to obtain desirable characteristics. The effect of alpha-beta transformation on mechanical properties of various titanium alloys was presented with excellent data. The talk was illustrated with slides.—**Reported by John M. Thompson for Rome Chapter.**

Receive 25-Year Certificates

Eclipse Fuel Engineering Co. and Ingersoll Milling Machine Co. Were Presented 25-Year Membership Certificates at a Meeting of the Rockford Chapter Held Recently. Shown receiving the certificates from J. Walker Eaton, Chapter chairman, are Leo J. Strohmeyer from Eclipse (left), and Palmer Carlson (center) from Ingersoll. Lloyd J. Oye, manager-field engineering, Magnaflux Corp., discussed "Nondestructive Methods of Inspection" during the meeting. (Reported by Quentin C. Bowen for Rockford)

Describes Advances In Alloy Steels at Los Angeles Meeting

Speaker: R. C. Altman

United States Steel Corp.

"New Developments in Alloy Steels" were discussed at a meeting of the **Los Angeles Chapter** by R. C. Altman, staff metallurgist, alloy steels, United States Steel Corp.

One of the new developments in alloy steels is their use at high strength levels. Mr. Altman described recent work done in evaluating mechanical properties of such steels as 98BV40 and 4340 with varying carbon content. These steels were heat treated at strength levels of 280,000 to 300,000 psi.

The use of steels at these high tensile strength levels presents new problems to both steelmakers and consumers. Close control of chemistry must be practiced so the ultimate in properties can be realized. Special attention must be paid to such factors as sufficient machining allowance to remove decarburization and surface defects, close control of the heat treating operation and surface finishes of the part.

The second development discussed was the application of the high strength, low alloy steels for bridge construction. The high carbon content of steels in the ASTM A-94 Class produces processing problems which have been minimized by the use of steels in the A-242 Class.

The final new development in alloy steels discussed by Mr. Altman was T-1 steel. This material is a quenched and tempered alloy steel plate product with approximately three times the yield strength of ordinary mild steel. It lends itself to the fabrication of welded products, being readily weldable without the necessity of preheating or stress relieving. Its other outstanding properties are exceptional toughness at subzero temperatures and resistance to the combination of impact abuses and abrasion.

With such characteristics, an important application for T-1 steels lies in the field of pressure vessels. Mr. Altman described the results of some tests conducted on welded pressure vessels which illustrated his point that T-1 steel has remarkable properties.—**Reported by H. A. Curwen for Los Angeles.**

Gives Trends in Toolsteels

Speaker: Hugh E. Replogle

Universal-Cyclops Steel Corp.

The first meeting of the season of the **Ontario Chapter** featured a talk on **"New Trends in Toolsteels" by Hugh E. Replogle, manager, toolsteel sales development, Universal-Cyclops Steel Corp.—Reported by G. H. McCally for Ontario.**

Describes New Cermet Materials at Southern Tier Chapter Meeting

Speaker: O. R. Stach

Borolite Corp.

"New Cermet Materials" was the title of a talk given before the **Southern Tier Chapter** by O. R. Stach, general manager of the Borolite Corp.

Mr. Stach outlined the major consideration in the development of cermets as related to the requirements of jet engines. The new class of cermets introduced by the speaker are those based on the borides and intermetallic compounds which contribute unusual properties to cermet compositions. Aside from jet engine usage, interesting commercial applications for boride-base cermets in particular were outlined. For example, the outstanding resistance of zirconium boride to corrosion by molten nonferrous metals has led to its use in aluminum die casting machines and immersion thermocouple protection tubes, as well as for molten metals containers. Applications employing the corrosion resistance of the new type of cermets are being realized and an interesting brazing alloy for the refractory metals has been developed.

Mr. Stach defined cermets and the possible scope of this field. The various types of cermets were discussed and the physical and mechanical properties of present constituents, such as refractory metals, oxides, borides, carbides and silicides, were related to the potential properties possible with cermet compositions. The production and physical properties of most widely known cermets were explained and the importance of the microstructure of these materials described.—**Reported by T. F. Conmy, Jr., for Southern Tier.**

Presents Progress Report On Titanium at Buffalo

Speaker: Loren W. Smith

Cornell Aeronautical Laboratory

The **Buffalo Chapter** was given a "Progress Report on Titanium" at a recent meeting by Loren W. Smith, head of the metallurgy section, Cornell Aeronautical Laboratory, Inc.

Mr. Smith is no stranger to titanium, having recently completed a survey of the aircraft industry and titanium producers to determine the problems encountered in the application of this new metal.

Though a potentially large market exists in the industrial field for titanium products, the current price has limited its use almost entirely to the aircraft industry. Here the commercially pure metal has proved superior on a weight-saving basis over other materials for nonstructural applications such as firewalls and fireseals in airframes and jet engines. However, because of its low strength, commercially pure titanium cannot compete with other aircraft structural metals outside of heat resistant applications. Higher strength titanium alloys are now being accepted as aircraft materials, especially for moderate elevated temperature uses where aluminum alloys lose their optimum strength-weight ratio ratings. Their use is only a fraction of what it could be if a complete change-over was made. Technical difficulties in the production of alloys must be overcome and fabricators must acquire the experience necessary to apply them with confidence. In this respect, titanium alloys are competing with materials that have been fabricated for years and for which there is a vast backlog of experience in every shop in the country. Mr. Smith assured his audience that the future of titanium is bright. Of prime importance is the lowering of cost, but, aside from this, producers and users must agree on what they expect from alloys and methods must be developed for the recovery of scrap.—**Reported by A. E. Leach for Buffalo.**

Talks on Machinability

Speaker: Francis W. Boulger

Battelle Memorial Institute

At the Toronto meeting of the **Ontario Chapter** held in October, Francis W. Boulger, chief of the division of ferrous metallurgical research, Battelle Memorial Institute, presented a talk entitled "Metallurgical Aspects of Machinability". Mr. Boulger's talk included a description of his work on the constant-pressure lathe test for measuring the machinability of free cutting steels.—**Reported by G. H. McCally for Ontario.**

Gives Outline of Induction Heating

Bruce E. McArthur (Left) Discusses His Talk on "Low-Frequency Induction Heating of Ferrous and Nonferrous Metals" With Members of the New Haven Chapter Who Heard Him Speak Recently. (Photo by F. E. Storm)

Speaker: Bruce E. McArthur

Magnethermic Corp.

Members of the **New Haven Chapter** heard Bruce E. McArthur, chief engineer, Magnethermic Corp., deliver an address entitled "Low-Frequency Induction Heating of Ferrous and Nonferrous Metals" recently.

In the past six years, 60-cycle induction heating has grown tremendously and found many applications throughout industry. It can be applied to through-heating of fairly large pieces of metal, and, in general, can be used to heat aluminum from 2 in. in diameter and up, brass from 3 in. in diameter and up, and steels to forging temperature, 4 in. in diameter and up. In heating steels below the Curie point, pieces 1 in. in diameter and up can be heated successfully. There are special arrangements for heating even smaller sizes than those indicated, and there is no limit on maximum size. At present, heaters are being built to heat aluminum billets 32 x 80 in.

Sixty-cycle induction heating can be used for all metals. It is now used to heat brass, copper alloys, aluminum, titanium, zirconium, steel and stainless steel. Application of 60-cycle induction heating has been made to annealing, preheat for welding and shrink fitting, hardening or heat treating steel rolls and heating for metalworking processes such as extrusion, rolling or forging.

Advantages of the 60-cycle induction heating process include: Heat is available in a matter of seconds; both temperature and production rate can be quickly and readily adjusted; floor space saving compared with fuel-fired furnaces is appreciable; uniform heating of billets; minimum scale; practically no decarburization; induction heater can be made a part of production line; and flexibility of production schedules, because in case of die breakage or schedule change, only a few minutes are required to change to new billet size or alloy and get back into performance.—**Reported by F. E. Strom for New Haven.**

Past Chairmen Hear History of Stamping

Present at Past Chairman's Night Held by Worcester Chapter Were, From Left: Herbert D. Berry, Technical Chairman; Fred Rimmler; R. E. Byrne, Who Spoke on "Effect of Metals on Stamping Procedures"; and William M. Mill, Who Gave a Short History of the Stamping Industry in Worcester

Speaker: Robert E. Byrne
Worcester Pressed Steel Co.

At the Past Chairman's Night Meeting of the **Worcester Chapter**, Robert E. Byrne, Worcester Pressed Steel Co., talked on the "Effect of Metals on Stamping Procedures".

He pointed out that the progress of the stamping industry ties in very closely with the story of metals in general. New and better materials have given the stamping industry tools to produce a wider range of parts, and various new metals have been instrumental in the development of the industry. Mr. Byrne gave credit for this progress to the work of men who were dreamers, inventive engineers and designers.

William M. Mill, president, Thomas Smith Co., gave a history of the stamping industry in Worcester industries over the past 100 years, and Fred Rimmler, plant manager, John Volkert Metal Stampings, Inc., showed a movie, "Stampings for Electronics".

Chairman Joseph C. Danec presented a past chairman's certificate to Harold J. Elmendorf, chief spring engineer, American Steel and Wire Division, U. S. Steel Corp., and introduced past chairmen Carroll Tucker, Warren Baker, Lloyd G. Field, Robert S. Morrow and Wendell J. Johnson.—**Reported by E. F. Grady for Worcester.**

Tatnall on Physical Testing

Speaker: F. G. Tatnall
Baldwin-Lima-Hamilton Corp.

"Physical Testing" was the subject of a talk delivered by Francis G. Tatnall, manager of testing research, Baldwin-Lima-Hamilton Corp., before the **Southern Tier Chapter.**

Mr. Tatnall discussed the invention and development of strain gages and their use in the physical testing of materials. He cited specific examples of strain gages in design and construction and illustrated their fields of application.—**Reported by T. F. Conmy, Jr., for Southern Tier.**

Describes Controlled Atmosphere Heat Treating at Rochester

Speaker: Orville E. Cullen
Surface Combustion Corp.

"Heat Treating in Controlled Atmospheres for Ferrous and Nonferrous Metals" was the title of the talk delivered by Orville E. Cullen, chief metallurgist, Surface Combustion Corp., at the first meeting of the **Rochester Chapter** this season.

A simple protective atmosphere is one which prevents oxidation. Atmospheres, in general, are of three basic types: oxidizing, neutralizing and reducing.

The speakers pointed out the fact that these terms are relative unless the metal or alloy being treated is known. By way of illustration, carbon dioxide is neutral to copper and is oxidizing to iron. Gases generally concerned in controlled atmosphere discussions are oxygen, carbon dioxide, carbon monoxide, water vapor, hydrogen and nitrogen. The more involved protective or controlled atmospheres can be used to carburize, carbon restore, homogeneous carburize or carbonitride steels.

Gas reactions with metals are both reversible and nonreversible. Control of the reaction (i.e., degree of completion) by proper adjustment of temperature, gas flow rates, metals present, etc., will produce the desired atmosphere. The effect of an atmosphere of water vapor, hydrogen, carbon dioxide and carbon monoxide on iron can be oxidizing or reducing depending on the H_2O/H_2 ratio, the CO_2/CO ratio, and the temperature.

The commercially available controlled atmospheres, which are produced from city or manufactured gas, propane or natural gas, were presented in chart form with a breakdown as to composition. Methods and equipment used in producing such atmospheres were described with the aid of schematic diagrams.

A number of slides were used by the speakers to illustrate many of the uses for controlled atmospheres. Significant among these were: Light-gage parts requiring considerable forming can now be worked into final shape with low carbon steel stock, after which the part can be prepared for quench hardening by building up the carbon content through exposure to a controlled gas-carburizing atmosphere; and, with the use of a controlled gas-carburizing atmosphere, certain steel companies are now offering nondecarburized steel stock for direct surface hardening. — **Reported by Sydney Gamlen for Rochester Chapter.**

Technical Papers Invited for A.S.M. Transactions

The Publications Committee of the A.S.M. will now receive technical papers for consideration for publication in the 1956 *Transactions* and probable presentation before a national meeting of the Society. A cordial invitation is extended to all members and nonmembers of the A.S.M. to submit technical papers to the Society.

Many of the papers approved by the Committee will be scheduled for presentation on the technical program of the 37th National Metal Congress and Exposition to be held in Philadelphia, Oct. 17-21, 1955. Papers that are selected for presentation will be preprinted. Manuscripts should be received at A.S.M. headquarters office not later than April 11, 1955.

Acceptance of a paper for publication does not necessarily infer that it will be presented. The selection of approved papers for the convention program will be made early in June.

Manuscripts in triplicate, plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, assistant secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Headquarters should be notified of your intention to submit a paper, and helpful suggestions for the preparation of technical papers, illustrations and drawings will be gladly forwarded.

New Alberta Chapter Hears Talk on Melting And Pouring of Bronze

Speaker: A. W. Cartwright
Crane Ltd.

At a meeting of the newly formed **Alberta Chapter,** A. W. Cartwright, metallurgist at Crane Ltd., presented an address entitled "Some Reflections on the Melting and Pouring of Bronze". Mr. Cartwright discussed his experiences with crucible and rotary furnaces, burning with coke and its oxidizing effects, coke vs. gas or oil in furnace atmospheres, combustion of free oxygen by use of coke in the crucible, dangers of hydrogen in gassing of bronze with gas and oil smelting and the use of salvage chips in reheat.

A. W. Cartwright

Mr. Cartwright explained a carborundum skimmer used in Crane's Montreal plant, illustrating pertinent points by the use of slides. He stated that this skimmer, in addition to various other methods of production and salvage, had assisted the plant in retrieving as much as 20 tons of salvage per month. Other pertinent factors relating to the skimmer, such as loss of heat and easy handling, were brought out and discussed.

The skimmer is slotted, which helps reduce the loss of metal temperature and results in a greater number of mold pours, and also allows the retention of dross and slag in the crucible. Approximately 25 pours of 500 lb. per pour can be made before the skimmer is burned on the original pouring side. It can then be rotated 90° and again be placed in operation. Thus, a total of about one ton of metal can be skimmed effectively before complete replacement is necessary. Mr. Cartwright stated that this skimmer was introduced into their plant by its designer and constructor, Leon Gadoury, foundry foreman.—**Reported by Ted Anderson for Alberta Chapter.**

TO A.S.M. Members: Many of you are looking forward with pleasure to more details about the Technical Societies Congress in Europe from June 1-19, 1955. If you wish to be immediately informed on additional plans as they develop for the technical program and the planned visits, then send your name to A.S.M. headquarters and request to be placed on the mailing list to receive information about "A.S.M. to Europe in '55".

New York Forms Long Island Section

Officers of the Newly Formed Long Island Activities Committee of the New York Chapter Include, From Left: William Rogers, Vice-Chairman; Herbert Balish, Chairman; James B. Austin, Guest Speaker at the First Meeting Held; Harold McCullough, Secretary; and Robert Platz, Committee Treasurer

The newly formed Long Island Activities Group of the New York Chapter held its first membership meeting in October. This was the first actual meeting of the members of the New York Chapter living in the Long Island area, a group formed largely through the efforts of William Rogers, its vice-chairman and H. Kalish, chairman. The activities group resulted from canvasses made by Mr. Rogers, and offers a convenient meeting place to members who would otherwise be forced to travel 40 to 60 miles to New York City in order to attend the meetings.

The meeting was attended by most of the members of the New York Chapter's executive committee and about 160 members. An excellent talk entitled "Metals of Tomorrow" was presented by A.S.M. Past President James B. Austin.

Participating executive officers of the Long Island Activities Group include: H. Kalish, chairman; W. Rogers, vice-chairman; H. McCullough, secretary; and R. Platz, treasurer.—**Reported by H. J. Corigliano for Long Island.**

Metallurgical Factors To Be Considered in Helicopter Production

Speakers: G. R. VanDuzee and N. Callahan
Sikorsky Aircraft Co.

The **Philadelphia Chapter** held its initial meeting of the year at Temple University. Speakers were Gerald VanDuzee, senior materials engineer, and Norman Callahan, chief materials and process engineer, Sikorsky Aircraft Co., who presented a talk on "Metallurgy of Helicopter Production".

Mr. VanDuzee discussed the effect of material defects upon fatigue life and stressed the importance of proper evaluation of the harmful effects of such material flaws. The use of X-ray, magnetic particle and dye-penetrant methods of inspection was discussed and the limitations of each method pointed out. Mr. VanDuzee also spoke of the need for adequate understanding of the potentially harmful effects of flaws before accepting or rejecting imperfect parts.

Mr. Callahan spoke of the problem of defects which can be built into satisfactory material by improper processing and stressed the importance of continual watchfulness to avoid the effects of incorrect processing. Mr. Callahan's talk was illustrated with a series of slides showing processing defects. Examples of grinding cracks, welding and heat treating cracks and fatigue failures were shown and the numerous failures due to poor design commented on.—**Reported by F. R. Romeo for Philadelphia Chapter.**

Metal Progress Media Information Prepared

Metal Progress has released its 1955 Market and Media Presentation, organized to conform with recommendations for such studies by the National Industrial Advertisers Association.

Working from the direct buying influence of the more than 24,000 metals engineering readers of *Metal Progress,* this new study outlines the metalworking markets reached by the publication, including the steels, nonferrous metals, metal forms, welding equipment, heat treating, metal fabricating, instruments, controls, cutting compounds and lubricants.

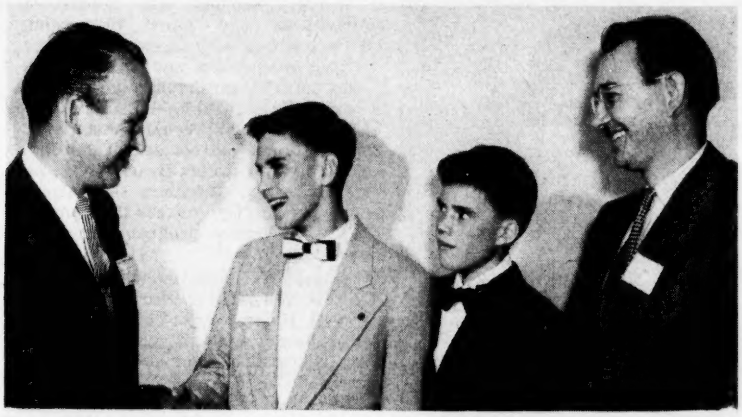
In addition, it examines, through case histories and research evidence, the high degree to which the metals engineers influence the purchasing and design functions of their companies and also provides complete information on the editorial, circulation and advertising polices of the magazine.

Copies of this presentation are being mailed to advertisers and their agencies. Additional copies may be obtained from *Metal Progress,* 7301 Euclid Ave., Cleveland 3, Ohio.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Akron	Jan. 19	Mayflower Hotel	Frank Klapp	Abrasives
Birmingham	Jan. 4	Hooper's Cafe	Leonard Zick	Testing of Tempered Martensitic Steels to Destruction
Boston	Jan. 7	M.I.T. Faculty Club	N. J. Grant	Gas Turbine Materials
Calumet	Jan. 11	Phil Smidt's	E. C. Varnum	Operations Research
Carolinas	Jan. 20	Salisbury	W. Kennicott	Designing for Cemented Carbides
Chattanooga	Jan. 17	Maypole Restaurant	R. Sutton	A.B.C. and I.O.U. of Steel Castings
Chicago	Jan. 10	Museum of Science and Industry	R. J. Johnson, Jr.	Metallurgical Problems in the Gas Turbine
Cincinnati	Jan. 13	Eng. Soc. Hqdtrs.	Jack Caine	Mechanical Properties of Cast Steels vs. Forgings
Cleveland	Jan. 10	Hollenden Hotel	G. A. Roberts	Toolsteels—New Developments and Applications
Dayton	Jan. 12	Engineers Club	T. C. DuMond	What's New in Engineering Materials
Detroit	Jan. 10	Engineering Society	A. G. Sturrock	Free Cutting Steels
Eastern New York	Jan. 11	Panetta's		Civilization Through Tools
Fort Wayne	Jan. 10	Howard Johnson's	Frank Foote	Material Problems in Nuclear Reactors
Georgia	Jan. 5		G. A. Roberts	Toolsteel—New Developments and Applications
Indianapolis	Jan. 17	McClarney's Restaurant	J. H. Hollomon	Behavior of Metals Under Load
Jacksonville	Jan. 3	Seminole Hotel	G. A. Roberts	Powder Metallurgy of Alloy Steels
Kansas City	Jan. 19	Milleman's Restaurant	W. C. Troy	Trends in Basic Research
Long Island	Jan. 26		R. Dowsland	Heavy Press Forging Practice as Related to Aircraft Industry
Los Angeles	Jan. 27	Rodger Young Auditorium	E. H. Dix, Jr.	Aluminum Continues to Meet Competition
Louisville	Jan. 11	Kapfhammer's Party House	G. A. Roberts	Powder Metallurgy of Alloy Steels
Mahoning Valley	Jan. 11	V. F. W.		Annual Grossmann Lecture
Manitoba	Jan. 13	Marlborough Hotel		Nickel Night
Milwaukee	Jan. 18	City Club	W. S. Pellini	Factors Which Determine Performance of Weldments
Montreal	Jan. 11	Queen's Hotel	F. L. LaQue	Some Apparent Anomalies in Corrosion
Muncie	Jan. 11	Anderson	Nathan Vahldieck	Chemistry of Corrosion
New Haven	Jan. 20	Hotel Barnum	C. T. Thompson	Effects of Surface Finish Control on Reducing Machining Costs
New Jersey	Jan. 17	Essex House	J. Y. Riedel	Tool Failures and Their Causes
New York	Jan. 10	Schwartz's Restaurant	Panel	Developments in Solders and Fluxes
North Texas	Jan. 20		G. A. Roberts	National Officers Night
Notre Dame	Jan. 12	Engineering Bldg.	Hiram Brown	High-Temperature Alloys
Oak Ridge	Jan. 19	K. of C. Hall	A. R. Lytle	Effects of Alloying Additions to Steel
Ontario				
Toronto	Jan. 7	Royal York Hotel	H. Thomasson	Metallurgy of Welding
Hamilton	Jan. 14	Royal Connaught Hotel	R. Smallman-Tew	Stump the Experts Night
Ottawa Valley	Jan. 4	PMRL	M. Lavigne	Role of Metallurgy in Atomic Energy
Philadelphia	Jan. 28	Engineers Club	J. D. Nisbet	Vacuum Melting
Jr. Section	Jan. 10	Engineers Club	Hugh Cooper	Titanium and the Other Reactive Metals
Purdue	Jan. 18	Memorial Union	J. F. Lincoln	Management-Sustaining Members Night
Rochester	Jan. 10	Howard Johnsons	C. Hendershot	Metal Finishing
Rockford	Jan. 27	Faust Hotel		President's Night
Rocky Mountain Denver	Jan. 21	Oxford Hotel	C. M. Henderson	Rare Earth Metal Additions to Alloy Steels
St. Louis	Jan. 13	DeSoto Hotel		
Saginaw Valley	Jan. 18	Frankenmuth Hotel	C. L. Faust	Practical Aspects of Electroplating
Texas	Jan. 18		G. A. Roberts	Toolsteel-Development and Applications
Toledo	Jan. 13	Maumee River Yacht Club	George Werley	Brass Powder Parts
Tri-City	Jan. 4	Rock Island Arsenal	F. E. Pringle	Ultrasonic Inspection—Theory, Equipment and Application
Washington	Jan. 10	Naylor's Restaurant	W. D. Manley	Materials Problems in Nuclear Reactors
Western Ontario	Jan. 14	Mario's Tavern	B. M. Hamilton	Toolsteels
Wichita	Jan. 18	K. of C. Hall	W. G. Johnson	Induction Heating
Worcester	Jan. 12	Hickory House	Howard Hinds	Wire Products at Their Best
York	Jan. 12		N. K. Koebel	

Presents Science Achievement Awards



Two Coffeyville (Kan.) Junior High-School Students, Winners of A.S.M. Science Achievement Awards, Were Guests of the Wichita Chapter at a Recent Meeting. Shown, from left, are: Eldon Van Meter, Chapter chairman; Roger Hall and Mead Wyman; and E. D. Freeman, A.S.M. representative from Coffeyville. About 80 members of the Chapter toured the Cessna Aircraft Co. following a dinner meeting during which Alden Trovillo, Cessna personnel director, outlined the history and present activity of the company. (Reported by A. L. Paxhia for the Wichita Chapter)

Gives Pointers on Starting Heat Treating Business

Speaker: Ben Rassieur
Paulo Products Co.

The **Missouri School of Mines Chapter** heard Ben Rassieur, president of Paulo Products Co., speak on "Establishment and Operation of a Commercial Heat Treating Firm" at a meeting held recently.

Mr. Rassieur described his own experiences in the heat treating field and gave pointers on how to start a heat treating business. He stressed the point that it was a good idea to start small and then expand, in order to eliminate the possibilities of large losses in case the business were to fail.—**Reported by C. R. Bieling for Missouri School of Mines.**

Steel Testing Methods Should Be Adapted to Application of Metals

Speaker: Glen C. Riegel
Caterpillar Tractor Co.

Glen C. Riegel, chief metallurgist, Caterpillar Tractor Co., spoke on "What Tests of Steel Are of Use" before the first meeting of the **York Chapter** this year.

Mr. Riegel discussed the various tests for steel and the fact that many tests are useless for the intended application of the steel.

The testing of ship plate steel to conform with both Federal and American Bureau of Ship Specifications does not guarantee satisfactory end results since the tests do not accurately reflect the conditions to which the ship plate is subjected. Mr. Riegel discussed the limitations of the usually accepted tension, ductility, bend, fatigue and impact tests and the failure of these tests to furnish a basis for predicting performance results unless all factors are considered.

An excellent set of slides showing typical service failures of steel parts and the behavior of steel during testing illustrated Mr. Riegel's talk.

It was concluded that tests for steel ought to be predicated upon the easiest means of discriminating at the earliest stages of processing which quality is acceptable and which isn't acceptable for the intended application.—**Reported by L. A. Hurwitz for York Chapter.**

Raudebaugh at Birmingham

Speaker: R. J. Raudebaugh
International Nickel Co.

Robert J. Raudebaugh of International Nickel Co.'s Research Laboratories, spoke on "Some of the More Recent Metallurgical Developments in Theory and Practice" at the Sustaining Members Night meeting of the **Birmingham Chapter.**

Prior to the technical session, representatives of the sustaining companies stated the type of work in which they were engaged and some of the products produced by their firms. Since a review of Dr. Raudebaugh's talk appears on p. 14 of this issue, it will not be repeated here. —**Reported by J. B. Templeton for Birmingham Chapter.**

Invite Spectroscopy Papers

The American Association of Spectrographers is planning its 6th Annual Conference in Chicago, May 6, 1955, on the subject "Industrial Applications of Spectroscopy". Contributed papers in the fields of emission, X-ray fluorescence or adsorption spectroscopy as applied to industry are invited. Abstracts must be submitted before Mar. 1, 1955.

Inquiries should be addressed to:
F. E. Stedman or E. E. Stilson
Engineering Research Laboratory
Bendix Products Division
401 N. Bendix Drive
South Bend 20, Ind.

Alloy Steel Film Shown at Springfield

Springfield Chapter Members Saw the Film "Alloy Steels" at a Meeting Held Recently. The film featured the operation of electric and openhearth furnaces, teeming, rolling, drawing, finishing and inspection of alloy steel bars and rod. George W. St. Clair, Bethlehem Steel Co., answered questions from the audience. He is shown, above right, with Lester Sheehan, technical chairman of the meeting and J. P. Gilligan, A.S.M. past-president. (Reported by Carl A. Keyser for Springfield Chapter)

Protective Coatings Described at K.C.

A. Korbelak (Left), Sales Manager, Sel-Rex Precision Metals, Inc., Speaker at the Opening Meeting of the Kansas City Season, Is Shown With R. R. Griner, Chapter Vice-Chairman. (Photo for C. P. Kenyon for Kansas City)

Speaker: A. Korbelak

Sel-Rex Precious Metals, Inc.

"Protective Coatings and Metal Finishing" was the topic of a talk presented by A. Korbelak, sales manager for Sel-Rex Precious Metals, Inc., at a meeting in **Kansas City.**

Mr. Korbelak described several new applications of electroplated metal coatings in high-temperature service. These coatings have been especially valuable in protecting molybdenum so its attractive high strength and hardness properties can be utilized. He also described chromium-nickel coating which can be applied with little difficulty and at a low cost.

Bright gold plating meets many industrial requirements for a decorative and protective finish. A rather hard, uniform deposit that needs no buffing can be applied under routine shop conditions.—**Reported by Kenneth E. Rose for Kansas City.**

Plans for Western Metal Congress and Exposition Progress

Technical programs of the Ninth Western Metal Congress are being formulated to serve specific needs of plants and production heads in the 11 western states.

Sessions will be presented by several technical societies in the Los Angeles Ambassador Hotel from Mar. 28 to Apr. 1, 1955. On the same dates the Ninth Western Metal Exposition will be held in the west's largest exhibit hall, Pan-Pacific Auditorium.

Technical groups which are cooperating with the American Society for Metals include: American Welding Society, Society for Nondestructive Testing and the Industrial Heating Equipment Association. Others have their programs in less advanced phases, but are making headway with speakers and subjects.

A.S.M. secretary William H. Eisenman, managing director of the Exposition has announced that the A.S.M. sessions will consist of the following topics: Titanium, powder metals, high strength steels, die materials and new forming methods for sheet metals, machining and tool materials and metals for the petroleum industry.

A.S.M. sessions will consist of roundtable and panel discussions, with authoritative speakers to present developments and answer problems confronting industry in the west.

S. R. Kallenbaugh, chairman of the Los Angeles Chapter and western district manager; Steel and Tube Division, Timken Roller Bearing Co., has merged the Chapter's educational and program committees to formulate A.S.M. technical programs for Congress sessions.

Harold H. Block, chief metallurgist, AiResearch Manufacturing Co., and Roy E. Paine, works chief metallurgist, Aluminum Co. of America, Chapter educational and program chairmen, will be in charge.

This Exposition is expected to be larger and more informative than its predecessor, the Eighth Western Metal Exposition, a record-breaker presented in 1953 in the same auditorium. It will fill Pan-Pacific Auditorium and two huge pavilions, totalling 150,000 sq. ft., all on the same floor level. More than 300 informative exhibits will disclose methods and machinery to cut costs and expedite production.

Twenty technical societies, including A.S.M., are co-sponsoring the Western Exposition and Congress. Members of co-sponsoring societies may register without charge for the Exposition in Pan-Pacific Auditorium, and invitations will be issued by exhibitors for others to attend.

Past Chairmen Hear Editor Speak

Past Chairmen Who Were Guests of Saginaw Valley Chapter When Allen G. Gray, Editor of Steel *Magazine, Spoke on "Metallurgical Progress" Included, From Left: E. R. Wilson (1945-46); A. H. Karpicke (1946-47); C. M. Campbell (1939-40); F. A. Simons (1950-51) and F. L. Mackin (1952-53)*

Speaker: Allen G. Gray

Steel Magazine

Past Chairmen who were guests of the **Saginaw Valley** Chapter at a recent meeting heard Allen G. Gray, editor of *Steel,* speak on "Metallurgical Progress".

Dr. Gray pointed out that the use of titanium is increasing in aircraft. In spite of the high cost of titanium, $10 per lb. in billet form, some aircraft now use as much as 5% by weight. The trend in the entire metalworking industry is toward more strength and less weight. The steel producers are developing alloy steels for higher weight-strength ratios, and nonferrous producers are also working in this direction.

New processes in the steel industry were discussed, particularly the oxygen converter and the continuous casting processes, which are expected to produce higher grade steel at less cost. Dr. Gray stated that the next 10 years should see great progress in basic steelmaking practice.—**Reported by E. L. Mannings for Saginaw Valley Chapter.**

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared by the Technical Information Division of Battelle Memorial Institute, Columbus, Ohio

A General Metallurgical

268-A. Some Views on the Present Position and Future of Electro-Metallurgy in India. E. H. Bucknall. *Central Electrochemical Research Institute, Karaikudi, Bulletin,* v. 1, July 1954, p. 6-18.

General review of present status, research underway and predictions of future expansion. Tables. 19 ref. (A general, C23, L17)

269-A. The Dilution Method for Industrial Waste Disposal. Hubert S. Kline and Joseph F. Fletcher. *General Motors Engineering Journal,* v. 1, Sept.-Oct. 1954, p. 38-43.

Regulated discharge of waste solutions solves stream pollution problem. Photographs, table, diagram. 2 ref. (A8)

270-A. Guides in Dust Collector Selection. John M. Kane. *Heating and Ventilating,* v. 51, Oct. 1954, p. 77-82.

Understanding basic data regarding equipment governs selection of proper type dust collector for a particular industrial process. Photographs, tables. (A8)

271-A. Condensed Review of Some Recently Developed Materials. *Machinery,* v. 61, Oct. 1954, p. 170-186.

Extensive tabulation of metals and metalworking agents with their properties and applications. (A general)

272-A. Swiss Non-Ferrous Metal Industry. R. Stadler. *Metal Industry,* v. 85, Sept. 24, 1954, p. 253-254.

Development and present status. (A general, EG-a)

273-A. Research Laboratories of A.I.A.G. Neuhausen. A. von Zeerleder. *Metal Industry,* v. 85, Sept. 24, 1954, p. 267-270.

Organization, equipment and aims of the Aluminium Industries A. G. research program. Photographs, graph, table. (A9, Al)

274-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging,* v. 21, Sept. 1954, p. 413-419.

From "Nilvar" to "Notch". Tables, photographs, diagrams, micrograph, circuit. (To be continued.) (A10)

275-A. A New Frontier in Metals. Bruce W. Gonser. *Monthly Business Review,* 1954, Oct., p. 12.

Effects of extremely small or trace amounts of impurities on the properties of metals. The new frontier is the study of metals of more than 99.9% purity. (A general)

276-A. U. S. Bureau of Mines Reports on Iron Ore in 1953. R. W. Holliday. *Skillings' Mining Review,* v. 43, Oct. 16, 1954, p. 1-2, 12-13.

Production and consumption statistics for U.S. Tables. (A4, Fe)

277-A. A Nuclear Reactor for Metallurgical Research. J. J. O'Connor and L. S. Foster. Paper from "Nuclear Engineering". American Institute of Chemical Engineers, p. 59-62.

Reactor designed for research utilizing neutrons in the fields of metallurgy and solid-state physics. Diagrams. (A9)

278-A. Iron and Steel. B. R. Davidson, R. W. Nichols and C. J. Leadbeater. Paper from "Reports on the Progress of Applied Chemistry". Society of Chemical Industry, p. 171-193.

Developments in Great Britain in steels and iron alloys. Covers properties, surface treatments and powder metallurgy. 178 ref. (A general, ST, Fe)

279-A. (German.) **The Behavior of Materials as a Problem in Design and Production.** H. Wiegand. *VDI Zeitschrift des Vereines deutscher Ingenieure,* v. 96, no. 27, Sept. 21, 1954, p. 927-932.

Fabrication properties of different steels and other metals with various surface conditions and surface treatments. Forming and welding procedures, high-temperature and fatigue resistance. Stresses importance of co-operation between the supplier, designer and production engineer. Diagrams, graphs, tables. 7 ref. (A general, ST)

280-A. (Polish.) **Reprocessing of Aluminum Scrap.** Marian Orman. *Hutnik,* v. 21, no. 7, July 1954, p. 229-239.

Types of scrap, sorting, remelting and refining methods. Equipment. Diagrams, tables. 10 ref. (A8, Al)

281-A. Automation: Today's Challenge to Process Engineers. *Iron Age,* v. 174, Oct. 21, 1954, p. 213-236.

Seven papers giving principles and specific examples of benefits gained by mechanized handling in production of metal articles. Photographs, diagrams. (A5)

282-A. Research in Canada. Harold J. Roast. *Metal Progress,* v. 66, Oct. 1954, p. 138-140.

Government-sponsored scientific research in Canada is a $35,000,000 business carried on by the National Research Council in 15 large and modern buildings by a staff of 2000. Varied metallurgical projects, both scientific and practical, are pursued. Photographs. (A9)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

283-A. Fundamental Research in Water Pollution Abatement at Mellon Institute. Richard D. Hoak. *American Iron and Steel Institute, Preprint,* 1954, 17 p.

Factors involving the metals industry. 8 ref. (A8)

284-A. 16th Biennial Materials of Construction Report. I. Survey of Materials. II. Corrosion Data Charts. III. Directory of Materials. *Chemical Engineering,* v. 61, Nov. 1954, p. 171-234.

Covers mechanical properties, corrosion resistance and applications of iron and steel, high-silicon irons, stainless steels, cast high alloys, 20 alloy, Worthite, Chlorimet, Hastelloys, aluminum, copper and alloys, lead, nickel and alloys, tantalum, polyethylene, unplasticized PVC, carbon and graphite, rubbers, glassed steel, cements, and fluorinated resins. Tabular and graphic data and suppliers. (A general, R general, Q general, T general)

285-A. The Economics of Replacement in the Steel Industry. G. G. Beard. *Iron and Steel Engineer,* v. 31, Oct. 1954, p. 55-65; disc., p. 65-66.

Procedures for determining time to replace equipment. Graphs, tables. 2 ref. (A4)

286-A. (Book.) **Introduction to Nuclear Engineering.** Raymond L. Murray. 418 p. 1954. Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y. $7.00.

Design, construction, testing, and operation of equipment using nuclear materials. (A general, Pu, U)

287-A. (Book.) **Materials of Construction.** M. O. Withey and G. W. Washa. 887 p. 1954. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $9.00.

Testing and properties of various metals. Surveys current knowledge on wrought iron, alloy steels, nonferrous metals, fatigue of materials, effect of mechanical work on the properties of steel, heat treatment of steel, and effects of temperature on the properties of metals. (A general)

288-A. (Book.) **Metals Handbook, 1954 Supplement.** Taylor Lyman and Carl H. Gerlach, editors. 184 p. 1954. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00.

Reports of 22 committees on topics representing fields of greatest advancement since 1948. Individual reports were previously abstracted from the July 15, 1954 issue of *Metal Progress.* (A general)

289-A. (Book.) **Procedures for Analyzing Metal-Finishing Wastes.** Metal-Finishing Industry Action Committee. 102 p. 1954. Ohio River Valley Water

Sanitation Commission, 414 Walnut St., Cincinnati 2, Ohio. $1.00.

Jointly tested and approved methods for cyanides and metals, adapted methods, and methods for over-all examination. (A8, L general, S11)

290-A. (Book.) **Reports on the Progress of Applied Chemistry.** F. Clark, editor. v. XXXVIII. 989 p. 1953. Society of Chemical Industry, 56 Victoria St., London S.W.1, England.

Total of 41 papers including six on development in iron and steel production; physical metallurgy, extraction, and refining of nonferrous metals; corrosion; refractories; and electrometallurgical industries of Great Britain. Papers are individually abstracted. (A general)

291-A. (Book.) **Yearbook of the American Iron and Steel Institute.** 302 p. 1954. American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y.

Contains 20 papers on various phases of the steel industry, individually abstracted. (A general, ST)

292-A. (Book-German.) **(History of Iron.) Geschichte des Eisens.** Otto Johannsen. 622 p. 1953. Verlag Stahleisen, Düsseldorf, Germany. DM 75.

Review of development of the iron and steel industry with emphasis on German, Austrian, and Scandinavian contributions. (A2, Fe, ST)

B

Raw Materials and Ore Preparation

285-B. How Slag Attacks Refractories. D. Dixon. *American Foundryman,* v. 26, Oct. 1954, p. 47-50.

Refractory melting points, effects of slag coatings, corrosion resistance of bricks and dissociation during kilning. Photographs. (B21, B19)

286-B. High-Capacity Magnetic Filter Treats Magnetite Concentrates. Bengt G. Fagerberg. *Engineering and Mining Journal,* v. 155, Oct. 1954, p. 77-79.

Equipment and operating characteristics. Diagrams, graphs, photograph, tables. (B14, Fe)

287-B. Filtration and Drying Methods in Wet Metallurgical Processes. C. C. Downie. *Mining Journal,* v. 243, Sept. 24, 1954, p. 342-343.

Vacuum filters, dryers and filtering arrangements. Details of the filtration and drying activities in the metallurgical field encompassing the drying of precipitates and crystals and rotary vacuum dryers. 9 ref. (B14)

288-B. Recovery of Ultrafine Mineral Values—a Progress Report. K. K. Kershner and A. A. Cochran. *U. S. Bureau of Mines, Report of Investigations* 5076, Sept. 1954, 7 p. + 3 plates.

Recovery of cassiterite from tin ore slimes. Tables, graphs, photograph. 9 ref. (B14, Sn)

289-B. Caustic Treatment of Zircon Sand. G. H. Beyer, D. R. Spink, J. B. West and H. A. Wilhelm. Paper from "Nuclear Engineering". American Institute of Chemical Engineers, p. 67-71.

Principle, convenience and economics of process for decomposing sand in securing zirconium for nuclear reactor structural material. Tables, diagrams. 8 ref. (B14, T25, Zr)

290-B. On the Viscosity of Blast-Furnace Slags. A. M. Chernyshev, L. M. Tsylev and A. V. Rudneva. *Henry Brutcher, Altadena, Calif., Translation no.* 3380, 21 p. (From *Izvestiya Akademii Nauk SSSR,* 1953, no. 7, July, p. 1044-1057.)

Previously abstracted from original. See item 34-B, 1954. (B21, D1)

291-B. (Norwegian.) **On the Thermodynamics of Fused Salts and Slags.** Tormod Förland. *Jernkontorets Annaler,* v. 138, no. 8, 1954, p. 455-478.

Ion exchange equilibria, activity of salt component in mixture of fused salts, formation of two liquid phases and deviation from random distribution of the ions in the mixture. Graphs, tables. 12 ref. (B21, P12)

292-B. (Polish.) **Recovery of Aluminum Oxide.** Julian Kwiatkowski. *Hutnik,* v. 21, no. 7, July 1954, p. 212-217.

Raw materials, alkali, acid and electrothermal sintering and sintering processes. Tables, diagrams. 2 ref. (B16, Al)

293-B. Rare Earths in Stainless Steels. Howard O. Beaver. *Metal Progress,* v. 66, Oct. 1954, p. 115-119.

While rare-earth oxides and misch metal are useful degasifiers in complex and high-chromium-nickel austenitic steels, residuals from misch metal are necessary to correct brittleness at forging ranges. The author has found no detrimental effects to other physical properties. Graphs, tables. (B22, Q general, EG-g, SS)

294-B. The Five Major Advances in Nonferrous Ore Dressing. C. H. Benedict. *Mining Engineering,* v. 6, Oct. 1954, p. 976-977.

Developments in shaking tables, fine grinding, hydraulic classification, mechanical thickeners and flotation. (B13, B14)

295-B. Steadily Growing Southeastern Tungsten Production. John V. Hamme. *Mining Engineering,* v. 6, Oct. 1954, p. 978-982.

Improvements in processing plant result in increased tungsten ore production. Equipment and operating procedures. Table, flowsheets, photographs. (B general, W)

296-B. Statistical Analysis Points the Way for $$$$ Savings in Beneficiation. A. C. Dorenfeld. *Mining Engineering,* v. 6, Oct. 1954, p. 986-988.

Evaluation when ore changes and analysis of process changes. Graphs, tables. 4 ref. (B14, S12, Zn)

297-B. Adding Lead to Steel—Here's How It's Done. Robert F. Huber. *Steel,* v. 135, Oct. 25, 1954, p. 150-152, 155.

Methods of adding and controlling distribution of lead in any steel. Photographs, table. (B22, D general, Pb, ST)

298-B. (English.) **On the Magnetic Property of Iron Oxides.** Hiroshi Kojima. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 6, no. 2, Apr. 1954, p. 178-185.

Magnetic behavior of alpha ferric oxide during reduction and magnetite during oxidation; chemical and X-ray analysis. Tables, graphs, diagram, micrograph. 5 ref. (B14, P16, Fe)

299-B. (English.) **The Role of the Electric Potential at the Phase Boundary in Flotation.** Onzo Jyo. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 6, no. 3, June 1954, p. 259-287.

Equations for the theoretical relationship of the zeta-potential and floatability. Zeta-potential data are not sufficient to anticipate change of floatability. Tables, graphs, diagram, 96 ref. (B14)

300-B. (German.) **The Leaching of Sulfide Minerals Under Oxygen Pressure.** G. Björling. *Metall,* v. 8, nos. 19-20, Oct. 1954, p. 781-784.

Advantages and disadvantages of floating sulfide ores of iron, copper, zinc, lead, nickel and cobalt under oxygen pressure and chemical reactions of the sulfides with oxygen. Diagrams, 7 ref. (B14, Fe, Cu, Zn, Pb, Ni, Co)

301-B. (Russian.) **Problem of the Reaction of Reagents With Zinc Blende.** I. N. Plaksin and G. N. Khazhinskaia. *Doklady Akademii Nauk SSSR,* v. 97, no. 6, Aug. 21, 1954, p. 1045-1046.

Effect of lime on absorption of ethyl xanthogenate by zinc sulfide. Flotation with and without activation by blue vitriol. Effect of iron impurities. 3 ref. (B14, Zn, Fe)

302-B. (Swedish.) **Aspects of Swedish Iron Ore Concentration.** P. G. Kihlstedt. *Jernkontorets Annaler,* v. 138, no. 9, 1954, p. 499-526; disc., p. 526-538.

Practices to determine best system for Swedish conditions. Tables, graphs. 20 ref. (B14, Fe)

303-B. Phase Equilibrium Studies of Steel Plant Refractories Systems. E. F. Osborn. *American Iron and Steel Institute, Preprint,* 1954, 33 p.

Factors influencing behavior of furnace linings. Diagrams, graphs, tables. 19 ref. (B19)

304-B. Increase Yield of Alumina. *Chemical Engineering,* v. 61, Nov. 1954, p. 334-337.

Modification of Bayer process recovers 90% of alumina. Photographs, flow sheets. (B14, Al)

305-B. Use of Beryllium in Light Metals. E. A. Smith, Jr. *Light Metal Age,* v. 12, Oct. 1954, p. 24-27, 37.

Small additions of beryllium make alloys more workable, stronger and harder by improving melt characteristics. Graph, photograph. (B22, Be, Al, Mg)

306-B. Titanium Ores Flow From Australian Beaches. George Farwell. *Light Metal Age,* v. 12, Oct. 1954, p. 30-31.

Reserves, composition and separation methods of black beach sands. Photograph. (B10, B14, Ti)

307-B. (French.) **Choice of Fuel for Heating of Furnaces.** *Fonderie,* 1954, no. 103, Aug., p. 4099-4101.

Cost factor in selecting fuel for molding ovens, crucible furnaces, enameling and rotary kilns. Table. (B18, E10, E18, L27, ST)

308-B. (German.) **Comparative Investigations of Special Foundry Cokes.** M. T. Mackowsky. *Giesserei,* v. 41, no. 20, Sept. 30, 1954, p. 540-541.

Differences in chemical composition, properties, reactivity and microstructure. Tables, micrographs. 3 ref. (B22)

C

Nonferrous Extraction and Refining

200-C. Some Observations on the Kroll Process for Titanium. F. S. Wartman, Don H. Baker, J. R. Nettle and V. E. Homme. *Electrochemical Society, Journal,* v. 101, Oct. 1954, p. 507-513.

Mechanism of reduction process. Causes of zonal variations of hardness in crude sponge are largely due to impurities in the magnesium. Photographs, tables, diagram, graph. 11 ref. (C26, Ti, Mg)

201-C. Extracting Zinc From Concentrates by Chlorination. John S. Sieger and Colin G. Fink. *Engineering and Mining Journal,* v. 155, Oct. 1954, p. 90-93.

Laboratory scale tests at high temperatures (650-750° C.) show that zinc and lead can be separated as volatile chlorides, leaving behind unchlorinated iron and/or manganese. Graphs. (C4, Zn, Pb, Mn)

202-C. Methods for Separating Rare-Earth Elements in Quantity as Developed at Iowa State College. F. H. Spedding and J. E. Powell. *Journal of Metals,* v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Oct. 1954, p. 1131-1135.

Description and evaluation of three processes involving ion exchange resins. Graphs. 29 ref. (C general, EG-g)

203-C. Electrolytic Preparation of Uranium From a Fluoride Bath. S. K. Kantan, N. Shreenivasan and G. S. Tendolkar. Paper from "Nuclear Engineering". American Institute of Chemical Engineers, p. 63-66.

Molybdenum as the cathode, current density 50 to 400 amp. per sq. dm., and temperature 725 to 900° C. studied. Relative merits of the double fluoride and tetrafluoride discussed. Graphs, tables, diagram. 2 ref. (C23, U)

204-C. Processing of Liquid Bismuth Alloys by Fused Salts. D. W. Bareis, R. H. Wiswall, Jr., and W. E. Winsche. Paper from "Nuclear Engineering". American Institute of Chemical Engineers, p. 228-237.

Experiments and justification of process used in Brookhaven liquid metal fuel reactor for extraction of fission products and possible applications of salt metal extraction processes to thorium-containing breeder blankets. Graphs, table. 5 ref. (C general, U, Bi)

205-C. Non-Ferrous Metals: Extraction and Refining. B. Fullman, editor. Paper from "Reports on the Progress of Applied Chemistry". Society of Chemical Industry, p. 194-207.

Review of British developments in mineral dressing, hydrometallurgy and smelting. 169 ref. (C general, B general, EG-a)

206-C. Electrochemical and Electrometallurgical Industries. H. D. C. Rapson. Paper from "Reports on the Progress of Applied Chemistry". Society of Chemical Industry, p. 243-266.

Surveys British studies of electrodeposition and metal finishing and studies of electrorefining of indium, zinc, antimony, iron, titanium and aluminum. 251 ref. (C23, L17, In, Zn, Sb, Fe, Ti, Al)

207-C. (German.) **Progressive Induction Melting.** Ernst von Kannen. *Giesserei,* v. 41, no. 18, Sept. 2, 1954, p. 456-459.

Design of line-frequency induction furnaces and comparison with other types of furnaces. Operation, advantages and power consumption. Photographs, diagrams, table. (C21, D6)

208-C. (German.) **On the Conservation of Copper in Aluminum Alloys.** Georg Schichtel. *Metallurgie und Giessereitechnik,* v. 4, no. 8, Aug. 1954, p. 375-376.

Modern German practice of producing cast and wrought aluminum alloys with little or no copper. Tables. (C general, Al, Cu)

209-C. (Polish.) **Trends in the Development of the Production of Aluminum by Electrolysis.** Marek Brafman. *Hutnik,* v. 21, no. 7, July 1954, p. 217-224.

Critical review of electrolysis of chlorides or of mixtures of cryolite and aluminum oxide and apparatus. Diagrams, graphs. 15 ref. (C23, Al)

210-C. (Polish.) **Electrolytic Refinement of Aluminum.** Zofia Maslanka-Orman. *Hutnik,* v. 21, no. 7, July 1954, p. 224-227.

Electrolytes and electrolytic apparatus, use of aircraft scrap, Polish achievements and refinement at temperatures below melting point. Diagrams. 17 ref. (C23, Al)

211-C. (Russian.) **Gas Reference Electrode for Measurement in Cryolite-Alumina Melts.** S. I. Rempel', N. A. Anisheva and L. P. Khodak. *Doklady Akademii Nauk SSSR,* v. 97, no. 5, Aug. 11, 1954, p. 859-862.

Variation of potential of oxygen-carbon electrode during variation in current strength. Diagram, graph. 5 ref. (C23, Al)

212-C. A Cell for the Preparation of Small Quantities of Alkali Metals. Philip S. Baker, G. F. Wells and W. R. Rathkamp. *Journal of Chemical Education,* v. 31, Oct. 1954, p. 515-518.

Development of a miniature cell designed for the preparation of alkali metals from small amounts of their salts. Photographs, table. 13 ref. (C23, EG-e)

213-C. (German.) **On the Reduction of WO_3.** O. Herrmann and H. Pfisterer. *Metall,* v. 8, nos. 19-20, Oct. 1954, p. 759-764.

Effect of ThO_2 and alkali silicate additions on the reducing process. Micrographs, graphs. 6 ref. (C21, W)

D
Ferrous Reduction and Refining

419-D. Desulphurizing With Solid Lime. Sven Eketorp. *Blast Furnace and Steel Plant,* v. 42, Oct. 1954, p. 1159-1161, 1177.

Treatment of pig iron in rotating furnace with finely ground burnt lime reduces sulfur content to 0.001%. 6 ref. (D1, Fe)

420-D. Improved Process Control Assures Economical Production of Extra Low Carbon Cast Stainless. R. W. de Weese. *Iron Age,* v. 174, Oct. 14, 1954, p. 133-135.

Practices used in arc and induction furnaces. Photographs, tables. (D5, D6, SS)

421-D. Measurement and Influence of Preheat in the Open-Hearth Furnace. W. P. Cashmore. *Iron and Steel Institute, Journal,* v. 178, Oct. 1954, p. 112-121.

Apparatus and experimental technique to determine effects of amount of preheat in various types of open-hearth and under various operating conditions. Graphs, diagram. 5 ref. (D2, ST)

422-D. Radioactive Measurement of Valve Leakage, Infiltration, and Blow-out in Open-Hearth Furnaces. E. B. Bell and D. Thomas. *Iron and Steel Institute, Journal,* v. 178, Oct. 1954, p. 122-126.

Use of radon to determine operating efficiency. Diagrams, graphs. 3 ref. (D2)

423-D. Investigations on Taphole Clays and Taphole Practice. W. Banks and H. M. Richardson. *Iron and Steel Institute, Journal,* v. 178, Oct. 1954, p. 138-146.

Properties of 12 commercial clays. Effects of compounding and blast furnace practice on behavior. Tables, graphs, diagram. (D1)

424-D. Slag-Metal-Graphite Reactions and the Activity of Silica in Lime-Alumina-Silica Slags. James C. Fulton and John Chipman. *Journal of Metals,* v. 6, Oct. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Oct. 1954, p. 1136-1146.

Experimental data on reduction of silicon from blast furnace-type slags by carbon-saturated iron; determination of conditions for formation of silicon carbide. Graphs, tables. 18 ref. (D1, P12, ST)

425-D. Joint Pouring of Basic Bessemer and Electric Furnace Steel. E. Ritter. *Henry Brutcher, Altadena, Calif., Translation no.* 3347, 14 p. (From *Stahl und Eisen,* v. 69, no. 8, 1949, p. 258-262.)

Previously abstracted from original. See item 2B-185, 1949. (D3, D5, ST)

426-D. (German.) **Appearance of Surface Blisters in Bottle-Shaped Ingots Used in the Production of Wheel Tires.** Arthur Schubert, Georg Wycisk and Helmut Scholte. *Metallurgie und Giessereitechnik,* v. 4, no. 8, Aug. 1954, p. 372-374, 356-358.

Chemical analyses, mechanical tests, metallographic investigations and re-examination of melting and casting process to determine cause of defects. Graph, photographs, micrographs. (D9, CN)

427-D. (German.) **The Evolution of the Basic Bessemer Steel Production in Europe and the Design of Basic Converter Steel Plants.** Hermann Brandi. *Stahl und Eisen,* v. 74, no. 20, Sept. 23, 1954, p. 1262-1267.

History and principles of modern practice. Diagrams, graphs, photographs. 2 ref. (D3, CN)

428-D. (German.) **New Findings and Contributions to the Metallurgy of the Basic Bessemer Process.** Hans Kosmider and Hermann Schenck. *Stahl und Eisen,* v. 74, no. 20, Sept. 23, 1954, p. 1281-1292.

Recent developments and improvements. Graphs. 8 ref. (D3, CN)

429-D. (German.) **Susceptibility of Free Machining Rimming Basic Bessemer Steel to Defects.** Helmut Knüppel and Karl Ernst Mayer. *Stahl und Eisen,* v. 74, no. 20, Sept. 23, 1954, p. 1292-1299.

Effects of oxygen, manganese, phosphorus, sulfur, nitrogen, slag and production variables. Graphs, tables. (D3, CN)

430-D. Non-Metallic Inclusions. I. Deoxidation Products. H. B. Bell. *Iron & Steel,* v. 27, Oct. 1954, p. 493-499.

Reactions induced by manganese, silicon, aluminum, vanadium, titanium, chromium, boron and zirconium during deoxidation of steel. Graph. 48 ref. (To be continued.) (D general, ST)

431-D. Studies in Reduction of Powdered Haematite. I. Batch Reduction. II. Continuous Reduction in a Rotary Kiln. R. M. Khandwala and G. S. Tendolkar. *Journal of Scientific & Industrial Research,* v. 13, sec. B, Aug. 1954, p. 561-571.

Includes graphs, tables, diagram. 29 ref. (D8, Fe)

432-D. (French.) **Principal Results of the Enquiry on Ingot Molds in French Basic Bessemer Steel Plants.** Jean Duflot. *Fonderie,* 1954, no. 103, Aug., p. 4078-4090.

Investigation in 19 steel plants and 18 foundries on design, preparation and use of ingot molds. 12 ref. Tables, drawings, charts. (D3, D9, ST, CI)

433-D. (French.) **Notes on the Solidification and Effervescence of Basic Bessemer Steel Ingots Weighing 4.6 Tons.** J. Duflot and A. Richard. *Revue de métallurgie,* v. 51, no. 9,

Sept. 1954, p. 623-655; disc., p. 655-657.

Effects of pouring rate, mold weight and composition of gases on solidification and surface quality. Diagrams, tables, graphs, photograph. 33 ref. (D9, D3, CN)

434-D. (Italian.) **Flame Radiation Power in Industrial Furnaces.** Francesco Savioli. *Metallurgia italiana,* v. 46, nos. 7-8, July-Aug. 1954; *Atti notizie (AIM),* v. 9, nos. 7-8, July-Aug. 1954, p. 215-225.

Thermokinetics and combustion mechanisms. Possible applications to openhearth furnaces. Diagrams, charts, table. 122 ref. (D2)

435-D. The Chemical Behavior of Silicon in the Iron Blast Furnace. James C. Fulton. *American Iron and Steel Institute, Preprint,* 1954, 14 p.

Reactions involving sulfur and silicon under various operating conditions. Graphs, table, diagrams. 20 ref. (D1, CI)

436-D. The Application of Thermodynamics to the Control of the Iron Blast Furnace. K. T. Goodchild. *Birmingham Metallurgical Society, Journal,* v. 34, Sept. 1954, p. 87-111.

Free energy change data explain reactions and conditions for their control. Diagrams, tables, graphs. 5 ref. (D1, P12, CI)

437-D. Properties of Burned-In Basic Open-Hearth Bottoms. A. S. Berezhnoi. *Henry Brutcher, Altadena, Calif., Translation no.* 2467, 16 p. (From *Stal,* v. 8, no. 1, 1948, p. 28-36.)

Chemical and phase composition and other characteristics, advantages of use of magnesite alone, stresses, contamination effects. Table, graphs, micrographs. 6 ref. (D2)

438-D. Rammed Ports and Front Walls in Open-Hearth Furnaces. V. N. Litvishko. *Henry Brutcher, Altadena, Calif., Translation no.* 2794, 3 p. (From *Stal,* v. 6, nos. 11-12, 1946, p. 697.)

Advantages, data on composition, preparation and application of ramming mix, ramming practice. Performance of furnaces with partly rammed linings. (D2)

439-D. Trial Production of Low-Nitrogen Steels in Basic-Lined Baby Converter. K. G. Speith and H. Bücken. *Henry Brutcher, Altadena, Calif., Translation no.* 2997, 18 p. (From *Archiv für das Eisenhüttenwesen,* v. 23, nos. 9-10, 1952, p. 325-333.)

Previously abstracted from original. See item 391-D, 1952. (D3, ST)

440-D. Problems of Pig Iron Production in the Low-Shaft Furnace. K. Säuberlich and R. Baake. *Henry Brutcher, Altadena, Calif., Translation no.* 3280, 13 p. (From *Metallurgie und Giessereitechnik,* v. 4, no. 2, 1954, p. 55-60.)

Previously abstracted from original. See item 185-D, 1954. (D8, CI)

441-D. Processing of Titaniferous Magnetites Based on Reduction of Ores With a Gaseous Reducing Agent at Moderate Temperatures. E. V. Snopova and N. I. Rotkov. *Henry Brutcher, Altadena, Calif., Translation no.* 3298, 20 p. (From *Trudy Uralgeomin (Uralsk. Nauch-Issled. Instituta Geologii, Razvedoki Issledovaniya Mineral'nogo Syr'ya),* 1938, no. 3, p. 285-293.)

Production of sponge iron by melting in high-frequency furnaces, and extraction of titanium and vanadium from the slag by chemical methods. Direct production of iron from ilmenite by action of hydrogen and carbon monoxide at moderate temperatures. Tables, 2 ref. (D8)

442-D. Contribution to the Study of the Metallurgy of Top Blowing. I. H. Rellermeyer and T. Kootz. *Henry Brutcher, Altadena, Calif., Translation no.* 3324, 20 p. (Abridged from *Stahl und Eisen,* v. 74, no. 7, 1954, p. 381-390.)

Previously abstracted from original. See item 187-D, 1954. (D3, ST)

443-D. (French.) **Contribution to the Study of the Role of Manganese in Refining in the Basic Bessemer Converter.** M. Cassier, P. Leroy and J. Stremsdoerfer. *Institut de Recherches de la Sidérurgie, Publications,* ser. A, no. 77, Sept. 1954, 36 p.

Preparation, correlations between composition of charge, preparation conditions and chemical characteristics of metal, ingot casting, rolling characteristics. Tables, graphs, charts. 17 ref. (D3, CN)

444-D. (French.) **Checking the Basic Bessemer Conversion by the Brightness of the Flame. Application to the Conversion by the Oxygen-Water Vapor Mixture.** J. Daubersy, *Revue universelle des mines,* v. 10, ser. 9, no. 10, Oct. 1954, p. 642-654.

Use of photo-electric cells for continuous measuring of brightness. Graphs. (D3, ST)

445-D. (Book.) **Metallurgical Progress.** John Taylor, P. T. Carter, and T. B. King. 80 p. 1954. Louis Cassier Co. Ltd., Dorset House, Stamford St., London, S.E.1, England. 3s., 4½d.

Reprints of "Critical Reviews" from *Iron and Steel,* covering ironmaking, steelmaking reactions, and solidification of steel. (D general, ST)

E
Foundry

640-E. Open Model Gray Iron Foundry. Herbert F. Scobie. *American Foundryman,* v. 26, Oct. 1954, p. 34-41.

New Fairbanks, Morse foundry, its capacity, production and operations. Photographs, diagram. (E11, CI)

641-E. Malleable Melting Control. L. E. Emery. *American Foundryman,* v. 26, Oct. 1954, p. 42-46.

Control procedures include specifications for raw materials, construction and repair of individual melting units, maintaining constant burner angle, keeping a furnace chart and slag and furnace atmosphere observations. Photographs, tables. (E10, CI)

642-E. Conveying Core Sand. John H. Kauffman. *American Foundryman,* v. 26, Oct. 1954, p. 51-55.

The best features of batch handling and pneumatic conveying equipment can be realized by combining the two methods. Photographs, diagrams. (E18, A5)

643-E. Foundry Facts. Analysis of Casting Defects. *American Foundryman,* v. 26, Oct. 1954, p. 67-68.

Outline of causes of gray iron casting defects. Photographs, chart. (E25, CI)

644-E. Making Castings by Push-button. *Business Week,* 1954, no. 1310, Oct. 9, p. 130-132, 134.

Foundry operations at Eberhard Mfg. Co., Cleveland. Iron castings, averaging about 2½ lb. each, are being shaken out of a completely automatic foundry at the rate of one per second. Photographs. (E general, CI)

645-E. Foundry Practice. VIII. The Cast Metal. IX. The Molten Metal. William H. Salmon and Eric N. Simons. *Edgar Allen News,* v. 33, Sept. 1954, p. 205-206.

Compression and hardness tests, defects, refractory materials. (To be continued.) (E general, Q28, Q29)

646-E. Founding of Marine Propellers. John M. Langham. *Foundry Trade Journal,* v. 97, Sept. 23, 1954, p. 343-348; Sept. 30, 1954, p. 387-394.

Review of current methods and equipment for casting bronze propellers. Diagrams, photographs, tables, graph. (To be continued.) (E general, Cu)

647-E. Electric-Induction Furnace on Industrial Frequency for the Production of Cast Irons. Aldo Tagliaferri and Claude Barbazanges. *Foundry Trade Journal,* v. 97, Sept. 23, 1954, p. 355-361.

Reasons for replacing cupolas by induction furnaces in Italian foundries. Diagram, graphs, photographs, tables. (E10, CI)

648-E. Inexpensive Shell Molding and Coremaking Machine Handles Job Work. W. G. Patton. *Iron Age,* v. 174, Oct. 7, 1954, p. 130-132.

New simplified equipment for small foundries. Photographs. (E16, E21)

649-E. Proteus Turbine Casing Produced by Centrifugal Casting. *Machinery (London),* v. 85, Sept. 24, 1954, p. 647-652.

Steps in producing complex casting of 12% nickel and 23% chromium heat resisting steel. Photographs, diagrams. (E14, CI)

650-E. Low-Frequency Induction Heating in the Die-Casting Shop. H. K. Barton and L. C. Barton. *Machinery (London),* v. 85, Sept. 24, 1954, p. 676-685.

Construction and advantages of equipment for production of aluminum and zinc castings. Diagrams, photographs. (E13, Al, Zn)

651-E. Aluminium Pirns. *Metal Industry,* v. 85, Sept. 17, 1954, p. 230-231.

Experimental four-impression die for difficult castings. Photographs. (E13, Al)

652-E. Where Strength Is Needed Die Castings Can Be Used. *Precision Metal Molding,* v. 12, Oct. 1954, p. 35-36, 90-91.

Design factors to consider and applications of aluminum and zinc die castings. Photographs. (E13, T general, Al, Zn)

653-E. Pearlitic Malleable Iron Stakes Claims to New Jobs for Castings. Carl F. Joseph. *SAE Journal,* v. 62, Oct. 1954, p. 71-74.

Simplicity and adaptability of a casting with the strength and reliability of a forging. Castings are competitive with forgings, stampings and weldments. Photographs, tables. (E general, Q23, CI)

654-E. Giants of Iwo Jima Made by Welding Bronze Castings. Herman C. Phelps. *Welding Engineer,* v. 39, Oct. 1954, p. 36-38, 42.

Details of casting and welding of 78-ft. memorial. Photographs. (E general, K general, Cu)

655-E. (German.) **Production of Silicon Cast Iron.** Paul Holtzhaussen. *Metallurgie und Giessereitechnik,* v. 4, no. 8, Aug. 1954, p. 369-372.

Successful compositions, melting temperatures and casting methods. Photograph, tables. 2 ref. (E general, CI)

656-E. (Swedish.) **Determination of Pouring Rate and Pouring Method by the Layer Method.** Sten Forslund. *Gjuteriet,* v. 44, no. 8, Aug. 1954, p. 129-138.

Effect of pouring speed on formation of cold shuts. By comparison of quality of product with calculated

rising speeds for different typical castings, values of critical rising speed are obtained from which the best pouring rate for comparable castings may be determined. Diagrams, photographs, micrographs, graphs. (E23, CI)

657-E. (Swedish.) Standards for Exchangeable Pattern Plates in Frames. *Gjuteriet,* v. 44, no. 8, Aug. 1954, p. 139-142.

Use of exchangeable pattern plates simplifies operation and reduces costs. Diagrams, tables. (E17)

658-E. Gun-Placed Silica Cupola Linings. T. E. Barlow and P. D. Humont. *American Ceramic Society Bulletin,* v. 33, Oct. 1954, p. 301-306.

A survey, including suggestions on the best method of handling the patching equipment and operating the furnaces or kilns to obtain maximum service from the refractory. Diagrams. (E10)

659-E. Vacuum Impregnation Makes Light Metals Castings Pressure Tight. *Modern Metals,* v. 10, Oct. 1954, p. 66.

New process completely seals microporosity in magnesium and aluminum castings. Photographs. (E25, Mg, Al)

660-E. (German.) Lining Basic Cupola Furnaces. Ernst Löbbecke. *Giesserei,* v. 41, no. 19, Sept. 1954, p. 477-485.

A critical review of literature on the status of development of basic and neutral refractory materials and their possible uses in cupola furnaces with and without cooling devices. Tables, graphs, photographs, diagrams. 101 ref. (E10)

661-E. (German.) Gating as a Basis of Nondefective Casting. A. Bockermann. *Giesserei,* v. 41, no. 19, Sept. 16, 1954, p. 492-493.

Proper and improper gating for casting different metals. Diagrams. (E22)

662-E. (Russian.) Casting of Steel Shot. F. T. Efimov, F. I. Mikhalev and P. G. Karpov. *Liteinoe Proizvodstvo,* 1954, no. 6, Sept., p. 1-3.

Casting operations and specially designed equipment for improved cast iron and steel shot. Advantages of latter. Photographs. (E general, CI)

663-E. (Russian.) Casting of Permanent Magnets. Ia. M. Dovgalevskii. *Liteinoe Proizvodstvo,* 1954, no. 6, Sept., p. 7-8.

Casting techniques and heat treatment of several alloys. Photographs, micrograph. 3 ref. (E11, J general, SG-n)

664-E. (Russian.) Blowing of Cast Iron by Oxygen in Multichamber Receivers. V. A. Fuklev. *Liteinoe Proizvodstvo,* 1954, no. 6, Sept., p. 14-16.

Amount of oxygen used, temperatures of metal before and after blowing, comparison of losses for one and three-chamber receivers. Diagrams, tables, graphs. 2 ref. (E10, CI)

665-E. (Russian.) Peculiarities of the Process of Crystallization of Centrifugal Castings. A. I. Baikov. *Liteinoe Proizvodstvo,* 1954, no. 6, Sept., p. 20-23.

Mathematical analysis accounting for exact manner of crystallization with different molds and for occurrence of flaws. Diagrams. 4 ref. (E14, N12)

666-E. High-Frequency Induction Furnaces Boost Foundry Melting Capacity, Widen Range of Metals Handled. W. D. Latiano. *Iron Age,* v. 174, Oct. 28, 1954, p. 95-98.

Integrated furnaces and power sources permit great flexibility in operations. Photographs. (E10, CI)

667-E. Practical Molding Sand Control. Frank S. Brewster. *Foundry,* v. 82, Nov. 1954, p. 102-107.

Principles and laws of sand management for improvement of foundry efficiency. Photograph, graphs, table, diagrams. (E18)

668-E. Fundamentals of Synthetic Molding Sand. Norman J. Dunbeck. *Foundry,* v. 82, Nov. 1954, p. 108-111.

Versatility and control techniques. Photographs. (E18)

669-E. Naturally Bonded Molding Sand. Richard H. Olmsted. *Foundry,* v. 82, Nov. 1954, p. 112-114.

Advantages of natural sands for foundries with limited equipment. Photograph. (E18)

670-E. Molding Sand Use in the Gray Iron Foundry. W. G. Parker. *Foundry,* v. 82, Nov. 1954, p. 116-121.

Properties of natural and synthetic sands and guides for selection. Graph, tables, photograph. 32 ref. (E18, CI)

671-E. Steel Foundry Molding Sand. John B. Caine. *Foundry,* v. 82, Nov. 1954, p. 122-125.

Specifications for various size molds, effects of sand on casting quality. Photograph, micrographs. (E18, CI)

672-E. Molding Sand Practice in the Malleable Foundry. L. E. Emery. *Foundry,* v. 82, Nov. 1954, p. 126-129.

Physical and mechanical requirements for sand system. Photographs. (E18, CI)

673-E. Molding Sand in the Brass Foundry. William B. George. *Foundry,* v. 82, Nov. 1954, p. 130-133.

Factors in maintaining good sand systems. Photographs, graphs, tables. (E18, Cu)

674-E. Aluminum Foundry Molding Sand Use. Walter J. Klayer. *Foundry,* v. 82, Nov. 1954, p. 134-137.

Benefits of sand control. Photographs. (E18, Al)

675-E. Magnesium Molding Sand. K. J. Hopp. *Foundry,* v. 82, Nov. 1954, p. 138-139.

Moisture control most important factor. Photographs. (E18, Mg)

676-E. Layer Method for Determining Teeming Speeds and Mould Orientation for Making Steel Castings. Sten H. C. Forslund. *Foundry Trade Journal,* v. 97, Oct. 7, 1954, p. 407-411.

Flow of metal in various parts of the mold, formation of cold-shuts, critical rising speeds. Practical application of the test method. Diagrams, photographs, graphs. (To be continued) (E23, CI)

677-E. Founding of Marine Propellers. John M. Langham. *Foundry Trade Journal,* v. 97, Oct. 7, 1954, p. 413-414; disc., p. 414-416.

Includes machining, finishing and inspection. Photographs. (E general, Cu)

678-E. Fluidity of Metals and Methods of Determining Fluidity. Yu. A. Klyachko and L. L. Kunin. *Henry Brutcher, Altadena, Calif., Translation no.* 2539, 22 p. (From *Zavodskaya Laboratoriya,* v. 15, no. 10, 1949, p. 1198-1206.)

Previously abstracted from original. See item 16-E, 1950. (E25)

679-E. Sulfur Removal From Cast Iron by Treatment With Magnesium. K. I. Vashchenko, P. V. Avrinskii and B. M. Pashkovskii. *Henry Brutcher, Altadena, Calif., Translation no.* 3386, 19 p. (From *Liteinoe Proizvodstvo,* v. 5, no. 1, 1954, p. 9-14.)

Previously abstracted from original. See item 180-E, 1954. (E25, CI)

680-E. (Czech.) Casting of Bimetallic Bronze Parts. Stanislav Lorenc and Milan Julina. *Slévarenstvi,* v. 2, no. 5, May 1954, p. 130-137.

Details of most frequently used methods for centrifugal castings, bearings and worm wheels. Diagrams, graph, tables, photographs, micrographs. 3 ref. (E14, Cu)

681-E. (Czech.) Experiences With Cupolas. Josef Plch. *Slévarenstvi,* v. 2, no. 5, May 1954, p. 144-146.

Design considerations for continuous flow of cast iron and slag. Diagrams. (E10, CI)

682-E. (Dutch.) The CO_2 Hardening Process for Molds and Cores. A. De Jong. *Metalen,* v. 9, no. 18, Sept. 30, 1954, p. 290-292.

Theory, practical method, properties of CO_2 cores, costs, advantages and disadvantages. Tables. 3 ref. (E19, E21)

683-E. (French.) Contribution to the Study of the Problem of Removal of Dust From Cupola Gases. Jean Prat. *Fonderie,* 1954, no. 104, Sept., p. 4147-4150.

Characteristics of cupola gases and suspended dusts. Tables, graphs, diagram. (E10, A8)

684-E. (French.) Standard for Preparing A-S13 and Neighboring Alloys. *Fonderie,* 1954, no. 104, Sept., p. 4151-4156.

Sand and chill casting standards for silicon cast iron. (E11, CI)

685-E. (French.) Gravity Die Casting of Light Alloys. Henry Garnier. *Revue de l'Aluminium,* v. 31, no. 212, July-Aug. 1954, p. 251-256.

Process and economic aspects of the method, and resultant effects on mechanical properties of the metal. Diagrams, photographs. (To be continued.) (E13, Q general, Al)

686-E. (German.) Problems of Handling Molding Sand. Karl Roesch. *Giesserei,* v. 41, no. 20, Sept. 30, 1954, p. 514-515.

Effect of heating on molding sand and clay, recovery of old sand by cooling and dedusting. Graphs, diagrams, photograph. 10 ref. (E18)

687-E. (German.) On the Use of Exothermic Gate Inserts for Nodular Cast Iron. Helmut Timmerbeil. *Giesserei,* v. 41, no. 20, Sept. 30, 1954, p. 519-521.

Thermite inserts improve quality and reduce relative size of the gate. Diagrams, micrographs. 1 ref. (E25, CI)

688-E. (German.) On the Fluidity of Cast Iron and Its Testing. Leo Hütter. *Giesserei,* v. 41, no. 20, Sept. 30, 1954, p. 528-534.

Review of literature, correlation between flow properties, viscosity and melt composition. Diagrams, graphs. 45 ref. (E25, CI)

689-E. (German.) Combustion Processes in the Shaft Furnace, Especially in the Cupola Furnaces, Until the Oxygen Is Consumed. Hans Schiffers. *Giesserei,* v. 41, no. 20, Sept. 30, 1954, p. 535-540.

Simultaneous formation of CO and CO_2 by a complex system of reactions, the law of combustion derived from the law of mass effect. Graphs, diagram. 14 ref. (E10, CI)

690-E. (Book.) Modern Foundry Practice. E. D. Howard, Ed. 384 p. 1954. Odhams Press, Long Acre Lane, London W.C.2. 12s 6d.

A symposium by various authors on most aspects of foundry practice. Ferrous and nonferrous materials. (E general)

F

Primary Mechanical Working

373-F. Quality Control in Wire Drawing. O. Herrmann. *Engineers' Digest,* v. 15, Sept. 1954, p. 369-371. (From *Draht,* 1954, no. 23, June, p. 26-30.)

Drawing-force indicator which informs operator of any variations in drawing conditions, thus insuring uniform quality, facilitates inspection and shows whether a new drawing die works satisfactorily in existing set-up. Graphs, diagram. (F28)

374-F. Elimination of Stretcher Strains in Mild-Steel Pressings. B. B. Hundy. *Iron and Steel Institute, Journal,* v. 178, Oct. 1954, p. 127-138 + 1 plate.

Study of residual stresses developed by temper rolling, roller leveling and stretching. High macroscopic and microscopic stresses are desirable. Graphs, micrograph, diffraction patterns. 23 ref. (F23, F29, G9, Q25, CN)

375-F. Relationship Between Drop-Forging Accuracy and Subsequent Machining Operations. K. Lange. *Metal Treatment and Drop Forging,* v. 21, Sept. 1954, p. 407-410, 412.

Influence of material, metal cutting technique, forging design and clamping technique on the allowances and tolerances made in design and accuracy of a forging for final machining. Diagrams, graphs. 6 ref. (F22, G17)

376-F. Why Electric Soaking Pits Are Used. Horace Drever. *Steel,* v. 135, Oct. 4, 1954, p. 100, 102.

Advantages include better surface finish, more uniform rolling, decarb controlled and less floor space required. Diagrams, photograph. (F21, ST)

377-F. Trends in Modern Forging. Robert G. Friedman. *Steel,* v. 135, Oct. 11, 1954, p. 118-119.

Developments which have permitted forging operations to be included in production lines. Photographs. (F22)

378-F. Speed Versus Output in Wire-Drawing. N. Davidson. *Wire Industry,* v. 21, Sept. 1954, p. 914, 917, 919.

Design of wiredrawing equipment, gravity blocks, light versus heavy drafting and producing on spools. (F28)

379-F. (German.) **Modern Machines for Deseaming Steel Ingots and Semi-Finished Products.** Hermann Hüber. *Stahl und Eisen,* v. 74, no. 19, Sept. 9, 1954, p. 1185-1192; disc., p. 1192-1195.

Methods and equipment for removing defects from ingots before forging or rolling. Graph, photographs, tables, diagrams. 3 ref. (F21, ST)

380-F. (German.) **Maintenance Cost of Soaking Pits.** Herbert Peters. *Stahl und Eisen,* v. 74, no. 19, Sept. 9, 1954, p. 1212-1215.

Repair costs, possible savings, soaking pit slags and performance of various types of brick. Diagrams, graphs, tables, photographs. 2 ref. (F21)

381-F. (Russian.) **Rapid Heating of Steel in Automatic Gas Furnaces.** V. F. Kopytov. *Vestnik Mashinostroenia,* v. 34, no. 8, Aug. 1954, p. 50-51.

Furnace types and their advantages. Uses include heating and feeding blanks into presses. Diagrams, graph. 1 ref. (F21, ST)

382-F. Copper and Copper Alloys for Wire and Tube Manufacture. R. F. Neller. *Australasian Engineer,* 1954, Aug., p. 62-66; disc., p. 66-68.

Effects of composition on hot workability of copper and copper alloys. Tables. 13 ref. (F28, F26, Cu)

383-F. Sendzimir Planetary Hot Mill. John H. Mort. *Iron & Steel,* v. 27, Oct. 1954, p. 486-490.

Application of mathematical formulas for design and operation. Tables, graphs. (F23)

384-F. Fabrication Study Points to Increased Titanium Applications. W. P. Brotherton. *Steel Processing,* v. 40, Oct. 1954, p. 650 + 6 pages.

Forming, welding and riveting experience on commercially pure titanium. Photographs. (F general, G general, K general, T general, Ti)

385-F. Gas vs. Oil vs. Gas-Oil for Forging. R. J. Reed. *Steel Processing,* v. 40, Oct. 1954, p. 653-660.

Survey failed to show any case in which changes in fuel alone appreciably improved production rate, fuel efficiency or product quality. Photographs, tables, graphs. 7 ref. (F22)

386-F. The Effects of Coiling Temperature on Hot Rolled Rod. R. A. Stebbins. *Wire and Wire Products,* v. 29, Oct. 1954, p. 1141-1142, 1247.

Substantial savings were obtained by coiling C-1008 steel rod at 1450° F. instead of 1750 or 1950° F. Table, graphs. (F27, CN)

387-F. Cooling of Steel Wire During Continuous Drawing. Norman A. Wilson. *Wire and Wire Products,* v. 29, Oct. 1954, p. 1160-1163, 1166-1169, 1253.

Improved air-cooling facilities permit higher drawing speeds. Photograph, graphs, diagrams, table. 7 ref. (F28, CN)

388-F. Temper Mill Control. George P. Dirth. *Iron and Steel Engineer,* v. 31, Oct. 1954, p. 81-92; disc., p. 92-93.

Regulation of rolling mill speeds. Diagrams, circuits. 3 ref. (F23)

389-F. Processing and Drawing of Steel Wire. P. A. Beaman. *Iron and Steel Engineer,* v. 31, Oct. 1954, p. 96-100.

Processes and treatments for producing high-quality, high-strength wire. Photographs. (F28, CN)

390-F. (German.) **Calculation of Spreading and of Forward Slip in Rolling.** A. Geleji. *Acta Technica Academiae Scientiarum Hungaricae,* v. 9, nos. 3-4, 1954, p. 443-458.

Effect of variations in dimensions of the rolled piece. Graphs, diagrams, 9 ref. (F23)

391-F. (German.) **Comparison of Various Lubricant Carriers Used in Drawing Stainless Steel Wire.** Herbert Kuntze and Anton Pomp. *Stahl und Eisen,* v. 74, no. 21, Oct. 7, 1954, p. 1325-1334.

Comparison of cemented carbide die wear and friction values. Micrograph, diagram, tables, photographs, graphs. (F1, F28, C-n, SS)

392-F. (German.) **The Effect of Lubricants on the Drawing Load in Steel Bar Drawing.** Werner Lueg and Karl-Heinz Treptow. *Stahl und Eisen.* v. 74, no. 21, Oct. 7, 1954, p. 1334-1342.

Comparison of physical and chemical characteristics of natural and synthetic lubricants. Influence of other variables on drawing load. Tables, micrographs, graphs, photographs. 12 ref. (F1, F27, ST)

393-F. (Book.) **Forming of Austenitic Chromium-Nickel Stainless Steels.** 2nd Ed. 394 p. 1954. International Nickel Company, Inc., 67 Wall Street, New York 5, N. Y.

Mechanical properties, forming characteristics, processing after forming, details of various forming operations. (F general, G general, Q general, SS)

394-F. (Book-German.) **(The Rolling of High-Quality Steels.) Das Walzen von Edelstählen,** H. Sedlaczek. 246 p. 1954. Verlag Stahleisen, Düsseldorf, Germany. 26 D.M.

An examination of all stages of production from cogging to rod and strip rolling; plant layout, mill design, furnace construction; problems of roll pass design and heat treatment; treatment of different steels. (F23, ST)

G

Secondary Mechanical Working

561-G. How Rohr Heats Dies to Form Titanium. J. E. Rheim. *American Machinist,* v. 98, Oct. 11, 1954, p. 161-163.

Liquid-media, electric cartridge and resistance heaters for dies to form aircraft engine mountings. Photographs. (G1, Ti)

562-G. The Grinding of Steel. XIX. Superfinishing. XX. Measurement of Surface Finish. *Edgar Allen News,* v. 33, Sept. 1954, p. 207-208.

Type of abrasive, procedure and special machinery used in finishing, surface measurement by optical, light and stylus methods. Photograph. (To be continued.) (G18, S14, ST)

563-G. Recording of Transient Phenomena in Machine Tools. S. Amari. *Engineers' Digest,* v. 15, Sept. 1954, p. 363-365, 368. (From *Macchine,* v. 9, no. 5, May 1954, p. 467-473.)

New method of point-by-point recording requires little equipment and gives direct recordings on paper. Photographs, diagram. (G17)

564-G. Some Aspects of Spark Machining. M. G. Seed and H. Drubba. *Engineers' Digest,* v. 15, Sept. 1954, p. 378-380.

Principle, applications and electrical aspects. Graphs, photograph, diagram, circuit. (G17, C-n)

565-G. Effect of Truing Conditions on Circular Grinding. G. Pahlitzsch and J. Appun. *Industrial Diamond Review,* v. 14, Sept. 1954, p. 185-189.

Effect of dressing variables on wheel roughness. Micrographs, diagrams, graph. (To be continued.) (G18)

566-G. How Ryan Forms Titanium. Frank Charity. *Machine and Tool Blue Book,* v. 49, Oct. 1954, p. 228-230, 232.

Commercially pure titanium is cold or hot formed with punch presses, bending rolls, brake presses, hydraulic presses and hammer facilities. Photographs. (G1, G6, Ti)

567-G. Temperature Field of a Turning Tool and the Reactions in the Zone of Contact. H. Opitz. *Microtecnic (English Ed.),* v. 8, no. 4, 1954, p. 183-188; disc., p. 189-190.

Temperature zones in cutting tools. Welding of chip to top rake face of tool. Electric potentials developed between tool and workpiece. Diagrams, graphs, circuits. (G17)

568-G. Simple Methods for Handling Sheet Metal Work. F. E. Riley. *Modern Machine Shop,* v. 27, Oct. 1954, p. 176-178.

Two helpful suggestions for handling frequently encountered sheet metal jobs in shops not ordinarily equipped to perform such work. Photographs. (G general)

569-G. The Mechanism of a Simple Deep-Drawing Operation. H. W.

Swift. *Sheet Metal Industries,* v. 31, no. 330, Oct. 1954, p. 817-828.

Investigations on drawing cylindrical shells from flat blanks. Diagrams, graphs, tables. 8 ref. (G4)

570-G. The Forming of Aluminium Sheet. VIII. Hand Forming. H. Hinxman. *Sheet Metal Industries,* v. 31, no. 330, Oct. 1954, p. 837-841.

Covers hollowing, raising, cutting and filing. Photographs. (To be continued.) (G general, Al)

571-G. Electrospark Machining of Metals. I. S. Bulkin. *Henry Brutcher, Altadena, Calif., Translation no.* 3284, 10 p. (Condensed from *Vestnik Mashinostroeniya,* v. 32, no. 11, 1952, p. 44-49.)

New electrospark machining installations. Photographs, circuit. (G17)

572-G. Surface Grinding of Rolls by the Electrospark Method. B. M. Gorbunov. *Henry Brutcher, Altadena, Calif., Translation no.* 3310, 13 p. (From *Vestnik Mashinostroeniya,* v. 33, no. 7, 1953, p. 67-70.)

Results attainable with electrospark grinding as against abrasive-wheel grinding and specific merits of electrospark method. Diagrams, photograph, table. 6 ref. (G18)

573-G. (German.) Belt Grinding or Disk Grinding? G. Pahlitzsch and H. Windisch. *Metalloberfläche,* Ausgabe A, v. 8, no. 9, Sept. 1954, p. 132-141.

Comparison of grinding belts and disks from economic efficiency. Advantages of belts with multiple layer of grinding material. Diagrams, graphs, table, photographs. 33 ref. (To be continued.) (G18)

574-G. (German.) New Information on the Wear of Cutters in the Milling of Structural Steel. H. Opitz and K. H. Fröhlich. *VDI Zeitschrift des Vereines deutscher Ingenieure,* v. 96, no. 25, Sept. 1, 1954, p. 822-830.

Effect of initial cutter-to-steel contact, machining conditions, and type of wear, instruments for measuring and recording cutter wear photographically and graphically, force and temperature of cutting and vibrations. Table, diagrams, graphs, photographs, micrographs. 12 ref. (G17, ST)

575-G. (German.) Research on the Spring-Back of Presses. Measuring Cutting Force, Spring-Back, and Cutting-Die Path. H. H. Emschermann and H. Peter. *VDI Zeitschrift des Vereines deutscher Ingenieure,* v. 96, no. 25, Sept. 1, 1954, p. 831-834.

Factors affecting efficiency of punchpress dies, including choice of type of press and die design. Diagrams, photographs, graphs. (G1, G2)

576-G. (Russian.) Efficient Cutting of Holes in Austenitic Steel by Countersinks. G. S. Andreev. *Vestnik Mashinostroeniya,* v. 34, no. 8, Aug. 1954, p. 31-34.

Criteria for effective cutting, feed, speed, angle, etc. Effect of previous heat treatment of steel. Graphs, diagram, table. 2 ref. (G17, AY)

577-G. Some Tooling Problems in Jet Engine Production. R. E. Andrews. *Australasian Engineer,* 1954, Aug., p. 42-52; disc., p. 52-53.

Forging, investment casting, milling, turning, broaching, reaming, brazing. Photographs, diagrams. 5 ref. (G17, E15, F22, K8)

578-G. The Mechanism of a Simple Drawing Operation. H. W. Swift. *Engineering,* v. 178, Oct. 1, 1954, p. 431-435.

Review of experimental and analytical investigations which have been made into the mechanism of deep drawing. Graphs, tables, diagram. 10 ref. (G4, ST)

579-G. Skin Milling by Chemical Solution. Manuel C. Sanz. *Metal Progress,* v. 66, Oct. 1954, p. 141-144.

Hot alkaline baths under adequate control can dissolve aluminum alloys at uniform rates and at such speed as to compete with skin milling and to open new avenues in airframe construction and parts design. Diagram, photographs, graph. (G17, Al)

580-G. Fabricating Characteristics of Stainless Steels. Richard E. Paret. *Product Engineering,* v. 25, Oct. 1954, p. 196-201.

Vital selection factors that distinguish three basic types of stainless steel according to their adaptability to different fabricating processes. Photographs, tables. (G general, SS)

581-G. How to Drill and Rivet Titanium. Thomas A. Dickinson. *Steel,* v. 135, Oct. 18, 1954, p. 96-97.

Techniques and precautions for safe processing. Table, diagram, photographs. (G17, K13, Ti)

582-G. Applications Increase as Leaded Steels Take Cut at Machining Costs. *Steel,* v. 135, Oct. 25, 1954, p. 159-160, 162.

Increased machinability gained by adding lead to any steel is leading to rapidly expanding applications. Photographs, table, graph. (G17, T general, AY)

583-G. (English.) Fundamental Research of the Superfinish. Tokio Sasaki and Kenjiro Okamura. *Memoirs of the Faculty of Engineering, Kyoto University,* v. 16, no. 3, July 1954, p. 157-165.

Includes diagrams, table, graphs. (G19)

584-G. (Russian.) Geometry of the Working Parts of Dies for Deep Drawing. P. G. Kovtun. *Stanki i Instrument,* v. 25, no. 9, Sept. 1954, p. 21-23.

Defects due to poor quality of metal and to form and dimensions of die parts. Correction formulas. Diagrams, table. (G4)

585-G. (Swedish.) Deep Drawing Properties of Sheet Steel. Fundamental Principles and Test Method. Olov Svahn. *Jernkontorets Annaler,* v. 138, no. 9, 1954, p. 573-605; disc., p. 606-610.

Tests made on 10 grades of steel. Two cup tests appear to closely approximate actual practice. International discussion invited. Diagrams, graphs, tables, photographs. 49 ref. (G4, CN)

586-G. Numerical Control—What it Means to Metalworking. William M. Stocker, Jr., and Charles D. Emerson. *American Machinist,* v. 98, Oct. 25, 1954, p. 133-156.

Detailed discussion of complete automatization by electronic controls. Examples of complex operations in various fields of metal fabrication. Photographs, diagrams, tables. (G general)

587-G. Fabrication of Commercially Pure Titanium. Andrew N. Eshman. *Light Metal Age,* v. 12, Oct. 1954, p. 10-11.

Preparation and forming techniques. Photograph. (G general, F general, Ti)

588-G. Successful Fabrication of Titanium Afterburners. F. W. LaMartine. *Light Metal Age,* v. 12, Oct. 1954, p. 14-15.

Special techniques for RC-70 titanium. Photographs. (G general, Ti)

589-G. Air Force Titanium Machinability Report. III. *Light Metal Age,* v. 12, Oct. 1954, p. 22-23.

Test data on drilling, tapping, abrasive cutting and hacksawing. Table. (G17, G18, Ti)

590-G. How to Machine Magnetic Ingot Iron. W. E. McFee. *Modern Machine Shop,* v. 27, Nov. 1954, p. 136-142.

Summary of helpful suggestions based on shop experience. Photographs, tables, diagrams. (G17, Fe)

591-G. Precision Flame Cutting Is Cost-Saving Method for Short Run Production Parts. Max Pearlman. *Western Metals,* v. 12, Oct. 1954, p. 50-52.

Unique equipment offers short cuts on variety of shapes and sizes of steel plate. Photographs. (G22, CN)

592-G. Machinability of Boron-Treated Steels. F. J. Daasch. *Tool Engineer,* v. 33, Nov. 1954, p. 85-88.

Results of tool-life tests for standard steels and their boron-treated alternates. Table, graphs, micrographs. (G17, AY)

593-G. (Book.) Constructional Steelwork Shop Practice: A Textbook for Apprentices and Students. John Farrell. The Louis Cassier Co., Ltd., Dorset House, Stamford Street, London, S.E.1, England. 15s.; postpaid 15s 6d. Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y.

A practical work covering all stages of the steel fabricating industry. (G general, F general, ST)

594-G. (Book.) The Grinding of Steel. E. N. Simons. Odhams Press Ltd., 98, Long Acre, London, W.C.2, England. 25s.

Basic factors in grinding, practical techniques, finishing processes, and grinding machines. (G18, ST)

H

Powder Metallurgy

145-H. Powder Metallurgy. *Iron Age,* v. 174, Sept. 30, 1954, p. 73 + 25 pages.

Production economies, press design trends, hot coining methods, sintering problems, plating techniques, high-density parts and part case histories. Photographs, micrographs, graph. 9 ref. (H general)

146-H. Cemented Carbides: Wear Resistance Uses Grow. F. J. Lennon. *Iron Age,* v. 174, Oct. 14, 1954, p. 142-144.

Cost reduction permits extended applications. Photographs. (H general, Q9, T general, C-n)

147-H. Hot Pressing, Press Forming Loom as Answers to Titanium Fabrication. H. W. Dodds and G. F. Davies. *Journal of Metals,* v. 6, Oct. 1954, p. 1116-1118.

New process powders titanium and keeps gaseous and metallic impurities at minimum. Product now produced by comminuting commercial grade of ductile titanium sponge. Photographs, graphs, table. 4 ref. (H14, Ti)

148-H. Powder Metallurgy Takes Its Place in Industry. Robert Talmage. *Mechanical Engineering,* v. 76, Oct. 1954, p. 817-820.

Advantages and savings from rapidly growing methods of producing metal precision parts. Photographs, table. (H general)

149-H. Sintering Metal Powder Compacts. P. F. Hancock. *Metal Industry,* v. 85, Sept. 17, 1954, p. 225-228.

Processes, equipment and atmospheres used in powder metallurgy. Photographs, diagram. (H15, Cu, Fe)

150-H. Manufacture of Sheet From Metal Powder. W. D. Jones. *Metal*

Treatment and Drop Forging, v. 21, Sept. 1954, p. 421-424, 430.

Iron and copper powder metallurgy, rolling, economics, powder flame spraying. Photographs. (H general, Fe, Cu)

151-H. Powder Metallurgy. *Precision Metal Molding*, v. 12, Oct. 1954, p. 50-54.

Outline to aid designers and buyers understand special features of the process. Photographs. (H general)

152-H. Hot Pressing of Copper Powders. R. Palme. *Henry Brutcher, Altadena, Calif., Translation no.* 3351, 9 p. (From *Metall*, v. 8, nos. 9-10, 1954, p. 369-371.)

Previously abstracted from original. See item 95-H, 1954. (H14, Cu)

153-H. (French.) **Some Possibilities of Powder Metallurgy in the Field of Aeronautics.** Nguyen Thien-Chi. *Métaux, Corrosion-Industries*, v. 29, nos. 347-348, July-Aug. 1954, p. 269-291.

Use of refractory metals, heavy alloys, titanium, cermets, porous bearings, electric contacts, magnetic materials and semiconductors. Photographs, tables, charts. (H general, T24, W, Mo, Ta, Ni, Cu, Ti)

154-H. (German.) **Recent Development of Hard Metals.** Alfred Merz. *Metallurgie und Giessereitechnik*, v. 4, no. 8, Aug. 1954, p. 342-348, 353.

Structure and properties of hard components and bonding metals. Recent advances made to increase toughness, hardness, wear resistance and scaling resistance with and without cobalt. Tables, diagrams, micrographs, graphs. 35 ref. (H general, Q23, Q29, R2, C-n, Co)

155-H. (Italian.) **Sintering Advantages and Limitations.** Neri Corsini. *Metallurgia italiana*, v. 46, nos. 7-8, July-Aug. 1954; *Atti notizie (AIM)*, v. 9 nos. 7-8, July-Aug. 1954, p. 209-211, 225.

Raw materials, equipment, depreciation and other processing costs. Table. (H15)

156-H. (Polish.) **Production of Zirconium Powder by Magnesium-Thermal Method.** W. Rutkowski. *Prace Instytutow Ministerstwa Hutnictwa*, v. 6, no. 4, 1954, p. 176-183.

Method produces zirconium of 92% purity from zircon. Tables, graphs, diagrams, micrographs. 11 ref. (H10, Zr)

157-H. (Polish.) **Iron Powder for Mass Products Obtained From Mill Scale Reduced by Hydrogen and Carbon.** B. Razumowski. *Prace Instytutow Ministerstwa Hutnictwa*, v. 6, no. 4, 1954, p. 188-199.

Use of hydrogen resulted in powder of 99% purity; purity was 97 to 98% when the scale was reduced by coal. Tables, micrographs, diagrams, graphs. (H10, Fe)

158-H. Chromium-Nickel Alloy Steel Powders for High Strength Parts. E. Gordon, W. V. Knopp and J. D. Shaw. *Materials & Methods*, v. 40, Oct. 1954, p. 107-109.

Properties and applications of prealloyed chromium-nickel powders when added to low-cost reduced iron powders produce strong and wear resistant products for pressing and sintering. Tables, micrographs. 1 ref. (H12, AY, Fe)

159-H. High Strength Steel Parts Produced by a New Powder Metallurgy Process. John W. Young. *Precision Metal Molding*, v. 12, Nov. 1954, p. 48-51, 89-92.

Details of new process, properties of typical parts. Table, graphs, photographs, micrographs. (H general, ST)

160-H. Corrosion Resistant, Iron-Base Metal Powder Products. N. I. Moskvin. *Henry Brutcher, Altadena, Calif., Translation no.* 2967, 7 p. (From *Vestnik Mashinostroeniya*, v. 32, no. 3, 1952, p. 73-76.)

Production and properties, simultaneous sintering and chromizing of iron-powder compacts. Tables, graphs, photographs, micrographs, diagrams. (H general, Fe, Cr)

161-H. Regularities in the Compacting of Copper-Graphite Powders. T. N. Znatokova and V. I. Likhtman. *Henry Brutcher, Altadena, Calif., Translation no.* 3382, 8 p. (From *Doklady Akademii Nauk SSSR*, v. 96, no. 3, 1954, p. 577-580.)

Previously abstracted from original. See item 118-H, 1954. (H11, Cu)

J
Heat Treatment

313-J. Cold Treatment Improves Accuracy, Life of V-Blocks. Bruno Sainati. *Iron Age*, v. 174, Oct. 14, 1954, p. 136-137.

Treatment of gages made from carburized low-alloy steel. Photographs, micrographs. (J2, AY)

314-J. Influence of Boron on Hardenability of Steel. J. C. Fisher. *Journal of Metals*, v. 6, Oct. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Oct. 1954, p. 1146-1147.

Model for describing action of boron. 6 ref. (J26, AY)

315-J. End-Quench Experiments With Aluminium Bronze. A. R. Bailey and H. C. Skevington. *Metal Industry*, v. 85, Oct. 1, 1954, p. 285-288.

Effects of rapid cooling on structures and mechanical properties. Tables, graphs, micrographs. 5 ref. (J26, Q general, Cu, Al)

316-J. Annealing for Optimum Machinability. H. C. Thomas. *Metal Treatment and Drop Forging*, v. 21, Sept. 1954, p. 403-406.

Heat treatment of low-alloy carburizing steels of SAE 4620 type and the results of machining tests. Micrographs, graphs. (J23, G17, AY)

317-J. Heat-Treatment in the Aircraft Industry. *Metal Treatment and Drop Forging*, v. 21, Sept. 1954, p. 411-412.

Furnaces required for aluminum alloy, beryllium copper and steel castings. Photographs. (J general, Al, Cu, CI)

318-J. (German.) **Oxy-Acetylene Stress Relief in Large Welded Constructions in Ship and Container Building.** H. Kunz. *Schweissen und Schneiden*, v. 6, no. 8, Aug. 1954, p. 328-340.

Techniques and equipment. Table, graphs, diagrams, photographs. 15 ref. (J1, ST)

319-J. (German.) **"Quetten"—Hardening Machines for Sheet Metals and Rolled Shapes.** H. Bühler. *VDI Zeitschrift des Vereines deutscher Ingenieure*, v. 96, no. 25, Sept. 1, 1954, p. 839-841.

To prevent warping from hardening, the steel sheets or parts are squeezed between two grates during the quenching process. Several types described and illustrated. Photographs, diagrams. (J26, ST)

320-J. (Russian.) **Heat Treatment of Welded Seams of Stainless Steel.** V. V. Chernyshev. *Vestnik Mashinostroeniia*, v. 34, no. 8, Aug. 1954, p. 83-85.

Effects of various heat treatments on corrosion resistance of welded chromium-nickel steels. Photographs, micrographs, table. (J general, R general, SS)

321-J. Texas-Produced Steel Pipe Normalized by High-Speed In-Line Gas Equipment. James Kniveton. *Gas Journal*, v. 181, Oct. 1, 1954, p. 16-17, 42.

Normalizing line and operating procedures. Photographs, diagrams, micrographs, table. (J24, CN)

322-J. Strategic Use of Outside Heat Treating Facilities Can Cut Costs. Ernest M. Olson. *Metal Treating*, v. 5, Sept.-Oct. 1954, p. 2-3, 30.

Factors determining when to farm out work or to purchase special equipment. Photographs. (J general)

323-J. Heat Treating Aluminum 'Superalloys'. Thomas A. Dickinson. *Metal Treating*, v. 5, Sept.-Oct. 1954, p. 10-11, 40.

Precautions and techniques in cleaning and heat treating of 75S aluminum alloys. Photographs, tables. (J general, L general, Al)

324-J. Induction Heat Treating. Selectivity Teams Up With Versatility. *Steel*, v. 135, Oct. 18, 1954, p. 92-95.

Advantages for hardening, tempering or stress-relieving parts in production lines. Photographs. (J2)

325-J. Continuous Patenting, Cleaning, and Coating. Donald K. White. *Wire and Wire Products*, v. 29, Oct. 1954, p. 1131-1140, 1248-1250.

Equipment and treatments for large-scale production of steel wire. Flow sheets, photographs, diagrams, table. (J25, F28, L general, CN)

326-J. Flame Hardening Now Applied to Bearing Areas of Crankshafts. Herbert Chase. *Automotive Industries*, v. 3, Oct. 15, 1954, p. 48-51.

Techniques and advantages of flame heating and quenching process to increase hardness. Photographs. (J2, ST)

327-J. 60-Cycle Induction Heating of Steel. C. D. Kramer. *Electrical Engineering*, v. 73, Nov. 1954, p. 1009-1012.

For certain specimen shapes low-frequency heating is economical. Graphs, photograph. 4 ref. (J2)

328-J. Improved Quench Methods Developed for Austempering, Martempering. Q. D. Mehrkam. *Iron Age*, v. 174, Oct. 28, 1954, p. 99-102.

Equipment, techniques and controls to improve properties of treated parts. Graphs, diagrams, photograph. (J26, ST)

329-J. Age-Hardenable Methods. John L. Everhart. *Materials & Methods*, v. 40, Oct. 1954, p. 121-136.

Age hardening processes and mechanical and physical properties of light metals, heavy nonferrous alloys, irons, steels and superalloys. Photographs, table. (J27, P general, Q general, EG-a, Fe, ST, SG-h)

330-J. Induction Hardening Practice and Equipment. *Mechanical World and Engineering Record*, v. 134, Oct. 1954, p. 452-455.

Principles and practice of the technique and considerations for wider applications. Photographs. (J2)

331-J. Induction Heating for Large Weldments. H. B. Osborn, Jr., and A. Lüthy. *Tool Engineer*, v. 33, Nov. 1954, p. 82-84.

Method provides proper control of heating before and after welding operations. Photographs. (J2, K general, ST)

332-J. Gas Carburizing. Its Application to Design. F. H. Conaty. *Western Machinery and Steel World*, v. 45, Oct. 1954, p. 110-114.

Basic principles, typical microstructures, processing techniques, design considerations. Micrographs, drawing, graphs, photographs. 6 ref. (J28, M27, ST)

333-J. (German.) **Quenching and Reheating of Steel Strip After Heating in the Continuous Furnace and After Direct Electric Resistance Heating.** Hermann Stromberg and Anton Pomp. *Stahl und Eisen*, v. 74, no. 21, Oct. 7, 1954, p. 1343-1358.

Equipment and techniques for tempering carbon steel strip. Mechanical properties produced by various treatments. Diagrams, graphs, tables, micrographs. 20 ref. (J29, Q general, CN)

K

Joining

684-K. New Zirconiated Tungsten Electrodes for Argon Arc Welding. *Edgar Allen News*, v. 33, Sept. 1954, p. 202.

Requirements, advantages, dimension specifications. Table. (K1, Zr, W)

685-K. Brazing and Grinding of Carbide-Tipped Tools. L. Fine. *Engineers' Digest*, v. 15, Sept. 1954, p. 366-368.

Procedures for increasing service life and reliability of tools. Photographs, table. (K8, G18, C-n)

686-K. Resistance Welding Joins Tantalum to Itself and Other Metals. John D. Kleis. *Industry & Welding*, v. 27, Oct. 1954, p. 74-75, 106.

Techniques for producing sound joints. Photograph. (K3, Ta)

687-K. Weldability of Copper-Base Alloys. *Industry & Welding*, v. 27, Oct. 1954, p. 86-90, 92.

Proper techniques for various alloys. Diagrams, table. (K9, Cu)

688-K. The Properties and Uses of Metal Adhesives. R. A. Johnson. *Sheet Metal Industries*, v. 31, no. 330, Oct. 1954, p. 829-835, 841.

Types, methods of use and applications. Tables, photographs, graphs, diagram. 12 ref. (K12)

689-K. Hydrogen, Welding's Big Troublemaker. II. Helmut Thielsch. *Steel*, v. 135, Oct. 4, 1954, p. 108, 111, 118.

Methods developed to combat effects of hydrogen in welded joints. Graphs, table. 2 ref. (K9, ST)

690-K. Safe Ways to Weld Gasoline Tanks. Clyde B. Clason. *Welding Engineer*, v. 39, Oct. 1954, p. 40-42.

Safety rules and cleaning methods. (K general, A7, CN)

691-K. Welding the Cylinders That Will Hold Welding Gases. *Welding Engineer*, v. 39, Oct. 1954, p. 50-53.

Requirements to be met and techniques for satisfactory production. Photographs. (K general, CN)

692-K. Influence of Hydrogen, Oxygen, and Nitrogen Upon Formation of Hot Cracks in 18-8 Steel Welds. I-III. D. I. Medovar. *Henry Brutcher, Altadena, Calif., Translation nos.* 3369-3371, 38 p. (From *Avtomaticheskaya Svarka*, v. 6, no. 4, 1953, p. 3-23.)

Effect of gases on structure and properties of welds in 18-8 steel. Diagrams, micrographs, graphs, tables. 35 ref. (K general, Q general, SS)

693-K. (French.) **Study on Furnace Brazing of Aluminum and Light Alloys.** Roger Biais. *Métaux, Corrosion-Industries*, v. 29, nos. 347-348, July-Aug. 1954, p. 303-314.

Principles and specific problems. Micrographs, diagrams, tables. 9 ref. (K8, Al)

694-K. (Russian.) **Strength of Welded Seams of Steel 40Kh in the Case of Flash Butt Welding.** N. A. Dmitriev. *Stanki i Instrument*, v. 25, no. 8, Aug. 1954, p. 25-26.

Effects of welding current and preliminary heat treatment on mechanical properties of chromium steel. Graphs, diagram. (K3, Q general, AY)

695-K. (Russian.) **Flash Welding, Utilizing High-Frequency Current and Anti-Oxidation Measures.** A. S. Gel'man. *Vestnik Mashinostroeniia*, v. 34, no. 8, Aug. 1954, p. 74-77.

Effects of current variables on weld quality. Tables, graphs, micrographs. 2 ref. (K3, CN)

696-K. (Russian.) **Comparison of Argon-Arc and Oxy-Acetylene Welding of Aluminum-Magnesium Alloy Pipes.** A. Ia. Brodskii and K. M. Poliakov. *Vestnik Mashinostroeniia*, v. 34, no. 8, Aug. 1954, p. 78-80.

Variations in preparations and welding techniques. Micrographs, tables, graph. (K1, K2, Al, Mg)

697-K. (Spanish.) **Design of Welded Constructions.** F. Koenigsberger. *Ciencia y técnica de la Soldadura*, v. 4, no. 18, May-June 1954, 7 p.

Problems relative to preparation of pieces, assembling, welding, deformation and reduction of stresses. Photographs, charts, diagrams. (K general)

698-K. (Spanish.) **Metallographic Characteristics of Various Welded Joints.** José Maria Sistiaga. *Ciencia y técnica de la Soldadura*, v. 4, no. 18, May-June 1954, 6 p.

Microscopic study of fusion, resistance, cold pressure, condenser and discharge welded steel and nonferrous metals. Micrographs. 9 ref. (K general, M27, ST, EG-a)

699-K. (Spanish.) **Methods of Inspection and Testing Applied to the Examination of Welders.** A. Mateos and J. Franco. *Ciencia y técnica de la Soldadura*, v. 4, no. 18, May-June 1954, 16 p.

Tests to determine quality of work for the purpose of setting standards for welders. Tables, diagrams, photographs, micrographs. (K9, A3)

700-K. (Spanish.) **New Method of Practical Testing for Checking the Quality of Spot Welding on Low-Alloy Semihard Steels.** P. Joumat. *Ciencia y técnica de la Soldadura*, v. 4, no. 18, May-June 1954, 5 p.

Twisting and shear testing method. Photographs, micrographs. (K3, AY)

701-K. Results of Service Test Program on Transition Welds Between Austenitic and Ferritic Steels at the Philip Sporn and Twin Branch Plants. G. E. Lien, F. Eberle and R. D. Wylie. *ASME, Transactions*, v. 76, Oct. 1954, p. 1075-1083; disc., p. 1083.

Relation of transition welds to their suitability and strength for high-temperature service. Diagrams, graphs, micrographs, photographs, table. 6 ref. (K general, AY, SS)

702-K. Spot Welding of Tinplate. M. J. Richard and D. W. Petchey. *British Welding Journal*, v. 1, Oct. 1954, p. 433-440.

Longest electrode life obtained with copper-chromium alloy tips using short weld times, large included-angle cone tips and low loads. Photograph, tables, oscillogram. 8 ref. (K3, CN, Sn)

703-K. Operating Data for the Murex Hot-Crack Testing Machine. E. C. Rollason and D. F. T. Roberts. *British Welding Journal*, v. 1, Oct. 1954, p. 441-447.

Practical significance of test data for mild and stainless steel electrode deposits. Photographs, diagrams, tables, graphs. 4 ref. (K9, CN, SS)

704-K. A New Process of Stud Welding. W. P. van den Blink, E. H. Ettema, and P. C. van der Willigen. *British Welding Journal*, v. 1, Oct. 1954, p. 447-454.

Use of a semiconductor cartridge to start the arc and to determine distance between the stud and plate. Diagrams, photographs. 3 ref. (K1, CN)

705-K. The Fusion Welding of Aluminium Alloys. Introduction. I. A Survey of Published Information on the Fusion Welding of Heat-Treatable Aluminium Alloys. H. E. Dixon. II. Review of Published Information on Weld Cracking in Aluminium Alloys, With Particular Reference to Al-Mg-Si Alloys. W. G. Hull and D. Adams. **III. Dilution and Uniformity in Aluminium Alloy Weld Beads.** P. T. Houldcroft. *British Welding Journal*, v. 1, Oct. 1954, p. 455-472.

Literature review and experimental study of factors influencing welding process. Tables, graphs, diagrams, micrograph. 47 ref. (K general, Al)

706-K. Field Welding Heavy-Wall Vessels. F. A. Upson. *Petroleum Refiner*, v. 33, Oct. 1954, p. 117-120.

Difficulties encountered, precautionary measures and methods in obtaining sound welds in heavy plate under field conditions. (K general, CN)

707-K. Titanium and Zirconium. F. Hirschmann. *Welding and Metal Fabrication*, v. 22, Oct. 1954, p. 377-380.

Argon-arc welding of pure metals and their alloys. Diagrams, table, micrographs. 32 ref. (K1, Ti, Zr)

708-K. The Spot Welding of Aluminimum Alloys. H. E. Dixon. *Welding and Metal Fabrication*, v. 22, Oct. 1954, p. 384-387.

Machine developments and research progress. Table, graphs. 37 ref. (K3, Al)

709-K. Directory of Welding and Fabricating Equipment. IV. Metal-Arc Welding Electrodes. Cast Iron. *Welding and Metal Fabrication*, v. 22, Oct. 1954, p. 397-400.

Tabulated data on names and characteristics of British electrodes for welding cast iron. (To be continued.) (K1, CI)

710-K. (French.) **Contribution to the Tensiometric Study of Adhesive Joining of Metals.** Henri L. Rosano and G. Diehl. *Recherche Aéronautique*, 1954, no. 40, July-Aug., p. 41-49.

Study of differently treated duralumin surfaces. Effects of orientation, constraint and geometry on joint strengths. Diagrams, table, photograph. 9 ref. (K12, Al)

711-K. (French.) **Studies on Argon-Arc Welding.** J. Brillie. *Soudure et Techniques connexes*, v. 8, nos. 7-8, July-Aug. 1954, p. 195-202; disc., p. 202-204.

High-speed photographic study. Applications of Nertalic process on aluminum, copper and stainless steel. Drawings, photographs. (K1, Al, Cu, SS)

712-K. (French.) **Production of Coated Electrodes for Arc Welding.** P. Ducornet. *Soudure et Techniques connexes*, v. 8, nos. 7-8, July-Aug. 1954, p. 219-222; disc., p. 223-225.

Modern production methods and research trends. (K1, T5)

713-K. (German.) **Use and Behavior of Inserts for Light Alloy Articles.** F. Walther. *Aluminium*, v. 30, no. 10, Oct. 1954, p. 417-421.

Advantages, techniques and strength of inserts for threaded joints in aluminum alloys. Diagrams, tables, graph, photographs. (K13, Q23, Al)

714-K. (German.) **Principles of Welding Cast Light-Metal Alloys.** E. Klosse. *Metall*, v. 8, nos., 19-20, Oct. 1954, p. 764-765.

Preparation and preheating. Principles of the chief methods of welding aluminum and magnesium alloys. 1 ref. (K general, Al, Mg)

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Principles and factors to consider in adapting steel spot welding equipment to nonferrous metals and alloys. Diagram, photographs, table. (K3, EG-a)

716-K. New Inert Arc Welding Process Speeds Fabrication of Mild Steel. C. H. Jennings and H. J. Bischel. *Industry & Welding,* v. 27, Nov. 1954, p. 58-60, 63-65.

New coated wire electrode for use with argon shielding. Photographs, table. (K1, CN)

717-K. Oxy-Acetylene Welding of Copper. *Industry & Welding,* v. 27, Nov. 1954, p. 47-49, 107-109.

Welding techniques, joint preparation, preheating and metallurgical changes. Photograph, tables. (K2, Cu)

718-K. Improved Rods and Techniques Overcome Crack Sensitivity in Magnet Steel Welds. J. J. Obrzut. *Iron Age,* v. 174, Oct. 28, 1954, p. 90-91.

Rod and coating compositions, requirements for welded electromagnets. Photographs. (K1, AY)

719-K. Titanium Brazing. II. *Light Metal Age,* v. 12, Oct. 1954, p. 28-29.

Structure of films formed on heated titanium, fluxing reagents, flow of brazing metals and effects of heating variables. Table. (K8, Ti)

720-K. Zinc Die Cast Threaded Fasteners. Ernest W. Horvick. *Materials & Methods,* v. 40, Oct. 1954, p. 110-111.

Design advantages and low-cost production result from process. Photographs. (K13, Zn)

721-K. Stub-Ending Drill Collars by Electric-Arc Welding. W. S. Bachman. *Oil and Gas Journal,* v. 53, Nov. 1, 1954, p. 85-87.

Process, welding techniques, preheat, stress-relief after welding and the design of the weld. Photographs, diagram, graph. (K1, J1, ST)

722-K. Arc Welding; Old Process Refined. C. H. Jenning and H. J. Bichsel. *Steel,* v. 135, Nov. 1, 1954, p. 84-85.

New coated electrode makes straight polarity operation possible. Photographs, table, graph. (K1)

723-K. New Ways of Automatic Arc Welding. T. B. Jefferson. *Welding Engineer,* v. 39, Nov. 1954, p. 36-39.

Techniques for increasing welding rates. Diagrams, photographs. (K1, CN)

724-K. Nitrogen for Tig Welding? T. B. Jefferson. *Welding Engineer,* v. 39, Nov. 1954, p. 43-45.

Tests indicate nitrogen may be suitable for gas-shielded welding of copper and other nonferrous metals. Photographs, table. 6 ref. (K1, Cu)

725-K. Flash Welding High Strength Alloy Steels. W. G. Fassnacht. *Welding Journal,* v. 33, Oct. 1954, p. 937-944.

Suggestions for solving the most important problems encountered in this type of welding. Photographs, table, graphs. (K3, AY)

726-K. Prediction of Angular Distortion Caused by One-Pass Fillet Welding. T. Kumose, T. Yoshida, T. Abbe and H. Onoue. *Welding Journal,* v. 33, Oct. 1954, p. 945-956.

Experimental data on mild steel tee joints. Effects of plastic and elastic prestrain. Graphs, diagrams, photographs. 2 ref. (K9, Q21, Q23, CN)

727-K. Spot Welding Aluminum With Single Phase Equipment. J. W. Kehoe and D. R. McCutcheon. *Welding Journal,* v. 33, Oct. 1954, p. 966-986.

Schedule developed for four widely used alloys in 257 combinations of alloy and thicknesses with eight machine settings. Photographs, graphs, tables. 5 ref. (K3, Al)

728-K. Metallurgical Aspects of Welding Precipitation-Hardening Stainless Steels. C. W. Funk and M. J. Granger. *Welding Journal,* v. 33, Oct. 1954, p. 496S-508S.

Response of welded joints to heat treatments and effects of such treatments and weld defects on mechanical properties. Graphs, tables, micrographs, photographs. 13 ref. (K general, J27, Q general, SS)

729-K. Performance of Weldments and Prime Plate of ABS-B Steel. W. S. Pellini and E. W. Eschbacher. *Welding Journal,* v. 33, Oct. 1954, p. 524S-531S.

Bulge-test and tensile evaluation of welds made with various electrodes. Tables, diagrams, graphs, micrograph, photographs. 6 ref. (K1, Q23, CN)

730-K. Series Spot Welding of 0.036-In. Auto Body Steel. Ernest F. Nippes and Frederick H. Domina. *Welding Journal,* v. 33, Oct. 1954, p. 535S-544S.

Effects of electrode shape, force, time, fusion zone diameter, material thickness, surface preparation and spot spacing on strength of welds. Tables, photographs, diagrams, graphs. 7 ref. (K3, Q23, CN)

731-K. (German.) **Physical Laws of Spot Welding Steel Sheets.** A. Matting and E. Rubo. *Schweissen und Schneiden,* v. 6, no. 9, Sept. 1954, p. 365-370.

Limitations of mathematical and physical analyses for determining optimum conditions. Functional relations of various factors. Micrograph, diagram, graph. 6 ref. (K3, CN)

732-K. (German.) **Welding of Large Clad Steel Containers.** M. Komers. *Schweissen und Schneiden,* v. 6, no. 9, Sept. 1954, p. 374-379.

Assembly, welding, control and heat treating of oil refinery structures. Photographs, diagrams, micrograph. 3 ref. (K general, J general, ST)

733-K. (German.) **Advances in the Field of Welding and Cutting. Important Recent Publications on Electric-Arc Welding Processes.** J. Ruge. *Schweissen und Schneiden,* v. 6, no. 9, Sept. 1954, p. 380-383.

Critical review. Tables. 80 ref. (K1, G22)

734-K. (German.) **Describing the Chemical Character of Silicate Melts, Especially of Powders for Welding With the Submerged Electric Arc.** Paul Beyersdorfer. *Silikattechnik,* v. 5, no. 9, Sept. 1954, p. 381-384.

Studies of various powders, fluxes and coatings for submerged-arc welding. Table. 6 ref. (K1)

735-K. (German and French.) **Phenomena of Diffusion During Welding.** Carl G. Keel. *Zeitschrift für Schweisstechnik,* v. 44, no. 10, Oct. 1954, p. 212-217.

Reactions between solid and liquid phases and between metals and gases, diffusion in molten alloys. Micrographs, graph. 8 ref. (K general, N1, N12)

736-K. (German.) **Welding With Low Heat Consumption.** G. M. Blanc. *Zeitschrift für Schweisstechnik,* v. 44, no. 10, Oct. 1954, p. 217-220.

Techniques and advantages of low-temperature gas and electric welding based on the alloying of the base metal with the weld-rod metal by diffusion. Micrographs, graph, photographs. (K2, K1)

737-K. (German and French.) **Technology of Protective-Gas Welding With Consumable Electrode (Sigma Welding).** Hans Schwarz. *Zeitschrift für Schweisstechnik,* v. 44, no. 10, Oct. 1954, p. 199-212.

Use of inert gases for welding aluminum and its alloys, copper and its alloys and stainless and carbon steels. Economy of the process. Photographs, graphs, diagram. 4 ref. (K1, Al, Cu, SS, Cn)

738-K. (Spanish.) **Theory and Applications of Fusionless Welding.** Alfred Dufner. *Ciencia y técnica de la Soldadura,* v. 4, no. 19, July-Aug. 1954, 4 p.

Principles of oxy-acetylene and electric-arc brazing. Micrographs, drawings. (K8)

739-K. (Book.) **Adhesive Bonding of Metals.** George Epstein. 218 p. Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y. $2.95.

Basic materials for adhesives; formulation; special high-temperature adhesives; design and testing; bonding techniques; sandwich constructions. (K12)

740-K. (Book.) **Basic Electricity.** G. K. Willecke. 96 p. 1954. Miller Electric Mfg. Co., Inc., Postoffice Box 798, Appleton, Wis. $1.00.

A collection of informal lectures on electrical fundamentals for arc welding operators. (K1)

741-K. (Book.) **Welding for Engineers.** Harry Udin, Edward R. Funk, and John Wulff. 430 p. 1954. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $7.50.

Cold, hot pressure, and resistance welding Permanent-electrode arc welding, consummable-electrode processes, and welding with chemical heat sources. Brazing and braze welding. Weld inspection and testing. (K general)

742-K. (Pamphlet.) **Resistance Welding Aluminum.** 21 p. 1954. Resistance Welder Manufacturers' Association, 1900 Arch St., Philadelphia 3, Pa. $0.20.

Preparation of aluminum and its alloys for welding; technical aspects of welding process. (K3, Al)

L

Cleaning, Coating and Finishing

892-L. Glutamic Acid as an Addition Agent in the Electrodeposition of Copper. S. Adamek and C. A. Winkler. *Canadian Journal of Chemistry,* v. 32, Oct. 1954, p. 931-940.

Polarization-time curves with glutamic acid show two polarization levels. Graphs. 14 ref. (L17, Cu)

893-L. The Electrodeposition of Some of the Transition Metals and Their Alloys From Aqueous Solution. M. L. Holt. *Central Electrochemical Research Institute, Karaikudi, Bulletin,* v. 1, July 1954, p. 21-26.

Principles of electron shell filling used to explain electrochemical behavior of various metals. Tables. 17 ref. (L17)

894-L. The Sulphamate Bath for Cadmium-Zinc Alloy Plating. T. L. Rama Char and J. Mathur. *Central Electrochemical Research Institute, Karaikudi, Bulletin,* v. 1, July 1954, p. 27-29.

Experimental data on effects of processing variables on obtaining alloys of different compositions. Graphs. 8 ref. (L17, Cd, Zn)

895-L. Hard Chromium Plating of Piston Rings. S. Ramachandran, S. R. Rajagopalan and B. B. Dey. *Cen-*

tral Electrochemical Research Institute, Karaikudi, Bulletin, v. 1, July 1954, p. 30-34.

Equipment and techniques for plating on cast iron. Diagram, table. 12 ref. (L17, Cr, CI)

896-L. "Solution Ceramics"—New Fields in Coatings. J. Scott Griffith and S. W. Broadstreet. *Ceramic Industry,* v. 63, Oct. 1954, p. 77, 141, 143.

New ceramic coatings developed at Armour Research Foundation. Spraying used to apply ceramic solutions to heated surfaces. Remarkable resistance to thermal shock, excellent adherence, and high corrosion resistance are promising properties of inorganic solutions. Extensive applications seen in refractories and enameling fields. Photograph, table. (L27)

897-L. Devices Developed for Accelerated Tests on High Temperature Ceramic Coatings. John V. Long. *Corrosion,* v. 10, Oct. 1954, p. 335-336.

Coatings tested for resistance to cyclic vibration, wetting, drying, heating and combinations of these conditions. Photographs. (L27)

898-L. Application Techniques, Physical Characteristics and Chemical Resistance of Polyvinyl Chlor-Acetates. *Corrosion,* v. 10, Oct. 1954, p. 349-354.

General considerations of organic coatings and specific data on properties and variables influencing their efficiency. Tables. 2 ref. (L26)

899-L. Anti-Corrosive Paints for Ships. II. J. C. Kingcome. *Corrosion Prevention and Control,* v. 1, Sept. 1954, p. 411-417.

Selection of primer and protective coats and special problems. Photographs. 12 ref. (L26)

900-L. Factors Affecting the Formation of Anodic Oxide Coatings. M. S. Hunter and P. Fowle. *Electrochemical Society, Journal,* v. 101, Oct. 1954, p. 514-519.

Effects of electrolyte and other variables. Graphs. 10 ref. (L19)

901-L. Cameo Is Enameling Aluminized Steel. Gilbert C. Close. *Finish,* v. 11, Oct. 1954, p. 40-41.

Advantages and applications of low-temperature frit to "aluminized" steel sheet material. Photographs. (L27, Al, ST)

902-L. Cleaning and Polishing Heat-Exchanger Parts. Raymond H. Spiotta. *Machinery,* v. 61, Oct. 1954, p. 160-164.

Grinding, polishing, buffing and electropolishing stainless steel food processing equipment. Photographs. (L10, L13, G18, SS)

903-L. Barrel Finishing Precision Machined Airframe Components. *Machinery (London),* v. 85, Sept. 17, 1954, p. 595-602.

Techniques employed by Vickers-Armstrongs for removal of tool lines and blending of surface defects. Photographs. (L10)

904-L. Titanium and Zirconium Cladding. J. E. Hughes. *Metal Treatment and Drop Forging,* v. 21, Sept. 1954, p. 431-432, 430.

Two methods, examples and applications in industry. Diagram. 6 ref. (L22, Ti, Zr)

905-L. Ceramic Coatings for Use in Nuclear Reactors. *National Bureau of Standards, Technical News Bulletin,* v. 38, Oct. 1954, p. 150-152.

Compositions, application techniques and properties of coatings for high-temperature protection for shields, moderators and fuel rods. Photographs, tables. 8 ref. (L27)

906-L. Good Results From Field Hardfacing. C. Swartsfager. *Oil and Gas Journal,* v. 53, Oct. 11, 1954, p. 150-152.

Hard surfacing equipment and procedures in the rock-drilling industry. Photographs. (L24, ST)

907-L. Stress Effect of Iron Contamination in a Watts Type Nickel Plating Solution and Its Correlation With Endurance Limit. L. H. Curkin and R. W. Moeller. *Plating,* v. 41, Oct. 1954, p. 1154-1157; disc., p. 1157-1158.

Contractometer and interferometer measurements correlated with fatigue limits of nickel-plated alloy steel specimens. Photograph, diagram, table, graphs. 3 ref. (L17, Q7, AY, Ni)

908-L. Copper-Tin Alloy Plating. W. H. Safranek and C. L. Faust. *Plating,* v. 41, Oct. 1954, p. 1159-1164, 1169-1170; disc., p. 1170.

Alloys with 17 to 50% tin show good leveling action and corrosion resistance. Tables, micrographs, photographs. 13 ref. (L17, Cu, Sn)

909-L. Equipment for the Study of Electrodeposition on Oxide-Soiled Surfaces. Henry B. Linford and David O. Feder. *Plating,* v. 41, Oct. 1954, p. 1183-1187.

Equipment and techniques for studying plating phenomena under closely controlled conditions. Table, photographs, diagrams. 5 ref. (L17)

910-L. Electropolishing Titanium. Sakae Tajima and Takemi Mori. *Products Finishing,* v. 19, Oct. 1954, p. 26-30, 32.

Bath compositions and operating procedures. Diagrams, tables. 4 ref. (L13, Ti)

911-L. Gas-Fired Pot Improves Galvanizing Operations. Arthur Q. Smith. *Products Finishing,* v. 19, Oct. 1954, p. 38-40, 42, 44.

Furnace and operating procedures. Photograph, diagram, chart. (L16, Zn)

912-L. Glass Pipe and Fittings. C. Fred Gurnham. *Products Finishing,* v. 19, Oct. 1954, p. 58 + 5 pages.

Chemical resistance and other properties of glass and advantages of use in electroplating industry. Photographs. (L17)

913-L. Dip Valves for Higher Performance. *Steel,* v. 135, Oct. 11, 1954, p. 114-115.

Process of coating automobile engine valves with aluminum to provide much longer service life. Photographs. (L16, Al, AY)

914-L. Improvement of Surface Finish of Ground Work Pieces by Electrolytic Polishing and Relationship Between Surface Finish & Mechanical Properties. J. Heyes. *Henry Brutcher, Altadena, Calif., Translation no.* 3335, 9 p. (From *Metalloberfläche,* v. 3, no. 12, 1951, p. B177-B179.)

Previously abstracted from original. See item 354-L, 1952. (L13, Q7, CN, AY)

915-L. Comparative Studies of Polishing Action of Phosphoric-Sulfuric and Acetic-Perchloric Acid Electrolytes. J. Heyes. *Henry Brutcher, Altadena, Calif., Translation no.* 3336, 8 p. (From *Metalloberfläche,* v. 3, no. 12, 1951, p. B179-B181.)

Previously abstracted from original. See item 355-L, 1952. (L13, CN)

916-L. Surface Impregnation of Steel With Vanadium. A. N. Minkevich. *Henry Brutcher, Altadena, Calif., Translation no.* 3345, 4 p. (From book *"Surface Impregnation of Steel",* Chapter XIII. Published by Mashgiz, Moscow, 1950.)

Effect of impregnation time in ferrovanadium powder upon case depth of vanadized iron. Microstructure and hardness. Tables, micrographs, graph. (L15, M27, Q29, V, ST)

917-L. Surface Impregnation of Steel With Nickel, Cobalt, Titanium, Zirconium, Tantalum, and Manganese. A. N. Minkevich. *Henry Brutcher, Altadena, Calif., Translation no.* 3346, 8 p. (From book *"Surface Impregnation of Steel",* Chapter XIV. Published by Mashgiz, Moscow, 1950.)

Russian data on surface impregnation of steel with more than one metallic element at a time. Graph. 7 ref. (L15, Ni, Co, Ti, Zr, Ta, Mn, ST)

918-L. (English.) The Anodic Oxidation of Uranium. O. Flint, J. J. Polling and A. Charlesby. *Acta Metallurgica,* v. 2, no. 5, Sept. 1954, p. 696-712.

Rates of oxidation and structures of films from 2 to 100 v. Similarities of anodic and thermal oxidation. Tables, graphs, electron diffraction patterns. 13 ref. (L19, R2, U)

919-L. (German.) Aluminizing Grate Bars. E. Kammeier. *Energietechnik,* v. 4, no. 8, Aug. 1954, p. 368-369.

Outlines operations of aluminizing grate bars as effective and economical method of prolonging service life. Photographs, micrographs. 5 ref. (L16, Al)

920-L. (German.) Further Development of the Technique of Metal Spraying. Hans Reininger. *Metalloberfläche,* Ausgabe B, v. 6, no. 9, Sept. 1954, p. 131-135.

Recent literature on use of sprayed metal coatings to prevent rusting of ferrous metals. Photographs, table. 43 ref. (To be continued.) (L23)

921-L. (German.) Coatings of Rubber and Plastics as a Protection of Metals. H. Anders. *Metalloberfläche,* Ausgabe A, v. 8, no. 9, Sept. 1954, p. 142.

Properties of rubber and plastic coatings. (L26)

922-L. (German.) Controlling the Properties of Ground-Coat Enamel on Sheet Metal. K. P. Asarow. *Silikattechnik,* v. 5, no. 8, Aug. 1954, p. 347-348.

Behavior of boron-containing and boron-free ground-coat enamels on sheet steel. Correlation of enamel composition to its properties. Graphs. 13 ref. (L27)

923-L. (Russian.) Problem of the Composition and Mechanism of Formation of a Film on Iron Obtained by Caustic Burnishing. I. V. Krotov. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 7, July 1954, p. 1327-1330.

Film formation as function of time and temperature. Graphs. 4 ref. (L10, Fe)

924-L. The Story of Shipbottom Protective Coatings. W. J. Francis. *Bureau of Ships Journal,* v. 3, Oct. 1954, p. 22-25.

Early research history, present uses and future prospects for hot plastic and quick-drying vinyl coatings. Photographs. (L26)

925-L. Chelating Agents in Electroplating. C. D. Leonard. *Electroplating and Metal Finishing,* v. 7, Oct. 1954, p. 365, 367, 369-370.

Chemical principles and applications. Tables, graphs. 6 ref. (L17)

926-L. The Electrodeposition and Protective Value of Zinc-Cadmium Alloys. N. I. Kudryavtsev and E. F. Pereturina. *Electroplating and Metal Finishing,* v. 7, Oct. 1954, p. 372-375. (From *Zhurnal Prikladnoi Khimii SSSR,* v. 26, no. 2, 1953, p. 155-159.)

Previously abstracted from the original. See item 139-C, 1953. (L17, R general, Zn, Cd)

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Processes, practical applications and variations of coating properties. Tables, photographs. 18 ref. (L19, Al)

928-L. Nickel Plating From Sulphamate Baths. Myron B. Diggin. *Metal Progress,* v. 66, Oct. 1954, p. 133-137.

Nickel plated from sulphamate-chloride solutions containing an organic addition agent has compressive internal stresses, high tensile strength, and hardness without brittleness. Possible applications. Micrographs, tables, graphs. (L17, Ni)

929-L. Organic Finishes on Plated Surfaces. *Organic Finishing,* v. 15, Sept. 1954, p. 11-14.

Coating problems with zinc, cadmium, copper, tin, nickel, chromium, silicon and gold plate. Table. (L26, Zn, Cd, Cu, Sn, Ni, Cr, Ag, Au)

930-L. Butyl Titanate Heat and Corrosion Resistant Paints. George W. Grupp. *Organic Finishing,* v. 15, Sept. 1954, p. 15-16.

Polymerization of buytl titanate; formulations and additives. (L26)

931-L. Cleaning of Stainless Steel for Wire Drawing. John H. Corson. *Wire and Wire Products,* v. 29, Oct. 1954, p. 1143-1144, 1146-1147.

Factors involved in make-up of oxidized surfaces and industrial cleaning practices. Tables, micrographs, photograph. 4 ref. (L12, F28, SS)

932-L. (Italian.) **Modern Varnishes.** Luciano Colombo. *Illustrazione Scientifica,* v. 6, no. 58, Sept. 1954, p. 20-25.

Preparation of iron surfaces, wash primers, under-water and anticorrosive vinyl paints and uses of vinyl and acrylic polymers in paint. Photographs. (L26)

933-L. (Polish.) **Coating of Steel by Aluminium Diffusion.** E. Gasior. *Prace Instytutow Ministerstwa Hutnictwa,* v. 6, no. 4, 1954, p. 200-209.

Properties of aluminum-iron coatings on steel. Coating methods, including Alitizing. Graphs, tables, diagrams, photographs. 28 ref. (L15, Al, ST)

934-L. Asphalt Emulsions as Protective Coatings. C. C. Weeks. *Chemistry in Canada,* v. 6, Oct. 1954, p. 33-37.

Nature, properties, applications and benefits of the emulsions in industry. Photographs. (L26)

935-L. Growth of Nickel Flashing —and Its Proper Control. J. J. Canfield. *Finish,* v. 11, Nov. 1954, p. 37 + 5 pages.

Effect of thin film of chemically deposited nickel on adherence of porcelain enamel. Flashing equipment and procedures. Photographs, micrographs, graphs. 16 ref. (L14, L27, Ni)

936-L. Flow Coat Priming. C. O. Hutchinson. *Finish,* v. 11, Nov. 1954, p. 43-44, 80-81.

Flow coating methods and equipment. Photographs. (L26)

937-L. Defects in Vitreous-Enamelled Iron Castings. E. R. Evans. *Foundry Trade Journal,* v. 97, Oct. 7, 1954, p. 421-425.

Types of defects and causes. Micrographs, diagram, table. 4 ref. (To be continued.) (L27, CI)

938-L. Lockheed's New Setup for Treating Aluminum Parts. W. F. Castell. *Industrial Finishing,* v. 30, Oct. 1954, p. 54 + 5 pages.

Principle and advantages of a chromate conversion process for corrosion prevention. Photographs. (L14, Al)

939-L. Electrodeposition of Tin Alloys. J. W. Cuthbertson. *Industrial Finishing (London),* v. 7, Oct. 1954, p. 176-183, 191.

Tin-zinc, tin-nickel, tin-cobalt and tin-antimony alloys described. Photographs, tables, diagram. 11 ref. (L17, Sn, Zn, Ni, Co, Sb)

940-L. Electrolytic Nickel-Clad Plate Offers Low-Cost Corrosion Protection. S. G. Bart. *Iron Age,* v. 174, Oct. 28, 1954, p. 87-89.

Properties and uses of 0.006 to 0.020-in. coatings on mild steel plate. Photographs, micrograph. (L17, Ni, CN)

941-L. Properties of Ceramic-Coated Metals. Burnham W. King. *Materials & Methods,* v. 40, Oct. 1954, p. 104-106.

Preparation, firing, chemical resistance, mechanical properties and applications outlined. Photographs, graph. 6 ref. (L27)

942-L. The Role of Cyanide Neutralization in the Surface Treatment of Steel. J. H. Peterson, G. M. Nichols and W. F. McDevit. *Metal Finishing,* v. 52, Oct. 1954, p. 62-64.

Carbon-14 used to determine amount of cyanide retained on pickled steel. Corrosion resistance of cleaned sheets. Tables. 2 ref. (L12, R general, S19, CN)

943-L. Chrome Plating of Gun Bores, C. Fred Gurnham. *Products Finishing,* v. 19, Nov. 1954, p. 56 + 4 pages.

Process for 90 mm. x 15-ft gun barrel from receipt to final finishes. (L17, Cr)

944-L. Finishes for Metals. Robert A. Wason. *Tool Engineer.* v, 33, Nov. 1954, p. 111-118.

Properties of organic finishes. Photographs. (L26)

945-L. On the Corrosion Resistance of Hard Chromium Plates. H. W. Dettner. *Henry Brutcher, Altadena, Calif., Translation no.* 2573, 12 p. (From *Metalloberfläche,* v. 4, no. 3, 1950, p. A33-A37.)

Previously abstracted from original. See item 292-L, 1950 (L17, R general, Cr)

946-L. Influence of Thiourea on the Electrodeposition of Nickel. L. I. Antropov and S. Ya. Popov. *Henry Brutcher, Altadena, Calif., Translation no.* 3379, 6 p. (From *Zhurnal Prikladnoi Khimii,* v. 27, no. 2, 1954, p. 206-209.)

Previously abstracted from original. See item 477-L, 1954. (L17, Ni)

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Properties, application, and advantages of bituminous coatings. Photographs, chart. (L26)

948-L. (French.) **Producing a Smooth Surface on an Oxide Cathode by Atomization and Measuring Its Roughness.** Y. Nakamura, S. Okada and Y. Kato. *Vide,* v. 9, no. 51, May, 1954. p. 75-80.

Electrostatic application of oxide coatings with precision of 1 to 2 μ. Diagrams, table, graphs, micrographs. 5 ref. (L14, S15)

949-L. (French.) **Problems Raised by Coating Oxide Cathodes by Atomization.** J. Schweitzer. *Vide,* v. 9, no. 51, May, 1954, p. 81-89.

Study of colloid techniques, adherence, choice of bonding material. Tables, graphs, diagrams. 11 ref. (L14)

950-L. (German.) **Defects on Zinc-Plated Sheet Metals.** Hans-Joachim Wiester and Dietrich Horstmann. *Metalloberfläche,* Ausgabe B, v. 6, no. 10, Oct. 1954, p. 145-151.

Various causes of defective zinc coatings. Photographs, micrographs. 14 ref. (L16, L17, Zn)

951-L. (German.) **Electrolytic Zinc Coatings and Their Subsequent Treatment.** Heinz W. Dettner. *Metalloberfläche,* Ausgabe B, v. 6, no. 10, Oct. 1954, p. 151-155.

Review of literature on effects of bath composition, temperature, and other operating conditions on electrolytic efficiency. Graphs. 68 ref. (L17, Zn).

952-L. (German.) **On the Uniform Deposition of Zinc by Pot Galvanizing.** F. Sautter. *Metalloberfläche,* Ausgabe B, v. 6, no. 10, Oct. 1954, p. 156-157.

Methods of improving uniformity of zinc coatings and of reducing zinc consumption without impairing quality. 3 ref. (L16, Zn)

953-L. (German.) **Zinc Coating and Painting.** Wilhelm Brachmann. *Metalloberfläche,* Ausgabe A, v. 8, no. 10, Oct. 1954, p. 157-160.

Protecting effect of zinc coatings on iron, advantages of combining zinc coating with paint. Diagrams, graph, tables. (To be continued.) (L16, L26, Zn, CN)

954-L. (German.) **Pointers on the Preparation of Titania Cover Coat Enamel.** Rudolf Märker. *Silikattechnik,* v. 5, no. 9, Sept. 1954, p. 385-386.

Development of enamel for kitchen utensils and household equipment which has good impact strength, acid resistance, and resistance to temperature changes. Tables. (L27)

955-L. (German.) **Titania Single-Coat Enamel for Steel.** Armin Petzold and Helmut Betzer. *Silikattechnik,* v. 5, no. 9, Sept. 1954, p. 387-388.

Review of current research developments. Photograph. (L27, ST)

956-L. (Russian.) **Microscopic Observation of the Anode Process During Electrolytic Polishing of Duralumin.** A. Sh. Valeev. *Zhurnal Prikladnoi Khimii,* v. 27, no. 9, Sept. 1954, p. 939-944.

In mixture of sulfuric, phosphoric and chromic acids, formation of film in anodal zone and adsorption by polished surface. Diagram. 13 ref. (L13, Al)

957-L. (Russian.) **Influence of Impurities on Electrolytic Deposition of Copper From a Pyrophosphate Electrolyte.** E. A. Ukshe and A. I. Levin. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 8, Aug. 1954, p. 1434-1438.

Influence of lead and iron cations and halides. Tables, graphs. 8 ref. (L17, Cu)

958-L. (Book.) **Galvanising Techniques in the U.S.A. Technical Assistance Mission No. 78.** 132 p. Organisation for European Economic Co-operation, 2 rue André-Pascal, Paris, France. 9/.

High-speed continuous galvanizing of sheet and tube. Lead-zinc and insoluble anode processes. Zinc electro-deposition on strip. Herman wire galvanizing. (L16, Zn)

959-L. (Book.) **Metallic Coatings on Non-Metallic Materials. Silver Films.** Report no. PB 111236. v. I. 138 p. 1954. Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C. $2.00.

Survey of general methods of metal coating and details of silver mirror making. (L general, Ag)

960-L. (Book.) **Metallic Coatings on Non-Metallic Materials. Copper Films.** Report no. PB 111237. v. II. 37 p. 1954. Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C. $1.00.

Thermal and chemical methods of depositing copper on nonmetallic surfaces. (L general, Cu)

961-L. (Book.) **Metallic Coatings on Non-Metallic Materials. Nickel Films.** Report no. PB 111330. v. III. 14 p. 1954. Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C. $1.00.

Thermal and chemical processes for nickel deposition. (L general, Ni)

962-L. (Book.) **Metallic Coatings on Non-Metallic Materials. Lead Sulfide Films.** Report no. PB 111331. v. IV. 19 p. 1954. Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C. $1.00.

Various processes; applications in mirrors, electrical resistance ele-

ments, planographic arts, rectifiers, detectors, and light-sensitive cells. (L general, Pb)

963-L. (Book.) **Metallic Coatings on Non-Metallic Materials. Gold Films.** Report no. PB 111332. v. V. 17 p. 1954. Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C. $1.00.

Deposition of films on glass, textiles, bakelite, and wood. (L general, Au)

964-L. (Book.) **Metallic Coatings on Non-Metallic Materials. Mechanical Films.** Report no. PB 111333. v. VI. 21 p. 1954. Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C. $1.00.

Methods of applying powdered metals on non-conductors. (L general, H general)

965-L. (Book.) **Metallic Coatings on Non-Metallic Materials. Metallic Paints for Printed Electronic Circuits and Other Uses.** Report no. PB 111334. v. VII. 30 p. 1954. Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C. $1.00.

Paints, fluxes, and application methods. List of precious metal suppliers. (L general, T1)

966-L. (Book.) **Metallic Coatings on Non-Metallic Materials. Vacuum Coating Methods.** Report no. PB 111335. v. VIII. 22 p. 1954. Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C. $1.00.

Modern evacuation methods for commercial vacuum coating in the electronics, optical, and decorative fields. (L25)

967-L. (Book.) **Metallic Coatings on Non-Metallic Materials. Applications of Metal Films on Commercial Products.** Report no. PB 111336. v. IX. 29 p. 1954. Office of technical Services, U. S. Dept. of Commerce, Washington, D. C. $1.00.

Materials and end uses of products upon which metal films have been formed. (L general)

968-L. (Book.) **Second International Conference on Hot Dip Galvanizing.** 236 p. Zinc Development Association, Lincoln House, Turl St., Oxford, England. 37s. 6d.

Papers include discussion of flaking which occurs when certain kinds of coating are bent; electrochemical behaviour in contact with hot water of iron-zinc alloy layer; effect of aluminum and iron on structure of galvanized coatings; requirements of bath; economics of process; and others. (L16, Zn)

M

Metallography, Constitution and Primary Structures

390-M. A Geiger Counter X-Ray Crystal Spectrometer. P. J. A. McKeown and A. R. Ubbelohde. *Journal of Scientific Instruments,* v. 31, Sept. 1954, p. 321-326.

Design and construction of a Geiger-Müller X-ray spectrometer suitable for the study of transitions in single crystals. Photographs, diagrams, circuits, graph. 12 ref. (M23, M26)

391-M. An Electron-Diffraction Examination of Thin Films of Lithium Fluoride and Copper Prepared by Vacuum Evaporation. J. S. Halliday, T. B. Rymer and K. H. R. Wright. *Royal Society, Proceedings,* v. 225, ser. A, Sept. 22, 1954, p. 548-563.

Effect of stress and specimen texture on diffraction pattern. Diagrams, graphs, tables. 13 ref. (M22, L25, Cu)

392-M. (English.) **The Nitrides and Oxide-Nitrides of Tungsten.** R. Kiessling and L. Peterson. *Acta Metallurgica,* v. 2, no. 5, Sept. 1954, p. 675-679.

Structures determined by chemical and X-ray methods. Tables. 9 ref. (M26, M27, W)

393-M. (English.) **Electron Configurations in Some Transition Metal Alloys.** W. H. Taylor. *Acta Metallurgica,* v. 2, no. 5, Sept. 1954, p. 684-695.

Review of structural data for aluminum-rich alloys of chromium, manganese, iron, cobalt and nickel indicates some of the important lines for future development. Tables. 20 ref. (M25, Al, Cr, Mn, Fe, Co, Ni)

394-M. (English.) **Relaxation Effects in Solid Solutions Arising From Changes in Local Order. I. Experimental.** B. G. Childs and A. D. Le Claire. *Acta Metallurgica,* v. 2, no. 5, Sept. 1954, p. 718-726.

Short-range ordering in relation to internal friction and relaxation properties of copper-zinc, copper-aluminum and platinum-nickel solid solution alloys. Graphs, tables. 12 ref. (M26, Q22, Cu, Zn, Al, Pt, Ni)

395-M. (German.) **Radiographic Investigations on Graphites From Iron-Carbon Alloys.** Wolfgang Gruhl and Ernst-Günter Nickel. *Giesserei,* v. 41, no. 18, Sept. 2, 1954, p. 453-456.

Investigations with a counting tube goniometer. Characteristics of differences and their interpretation. Diagrams, tables, micrographs. 7 ref. (M23, Fe, C)

396-M. (German.) **Etch-Printing Process for Phosphorus and for Distinguishing Gray from White Zones in Mottled Cast Iron by the Structure-Developing Method With Sodium Thiosulfate.** Heinz Klemm. *Metallurgie und Giessereitechnik,* v. 4, no. 8, Aug. 1954, p. 362-365, 360.

Methods of depicting phosphide segregations and the distribution of gray and white zones in cast iron. Photographs, micrographs. 21 ref. (M21, CI)

397-M. (German.) **Boundary-Layer Investigations on Lead-Tin Alloys.** Klaus Detert. *Zeitschrift für Metallkunde,* v. 45, no. 9, Sept. 1954, p. 547-550.

Metallographic and chemical investigation of phase structure of cast alloys indicates a eutectic surface regardless of tin concentration and cooling rate. Micrographs, table, graph, diagram. 5 ref. (M24, Pb, Sn)

398-M. (Russian.) **Dilatometric Investigation of the Zeta Phase of the Iron-Silicon System.** P. V. Gel'd and N. N. Serebrennikov. *Doklady Akademii Nauk SSSR,* v. 97, no. 5, Aug. 11, 1954, p. 827-830.

Thermal expansion curves for specimens between 0 and 1000° C. Graphs. 4 ref. (M26, M23, Si, Fe)

399-M. The Practical Applications of a System of Metallographic Polishing Using Diamond Abrasives. L. E. Samuels and M. Hatherly. Commonwealth of Australia, Dept. of Supply, Defence Standards Laboratories Report 200, Feb. 1954, 14 p.

Improved techniques for polishing of ferrous, aluminum, magnesium and copper alloys. Micrographs. 12 ref. (M21, Fe, Al, Mg, Cu)

400-M. (French.) **Orientation of Crystals in Rolled Uranium.** A. Winogradski. *Revue de métallurgie,* v. 51, no. 9, Sept. 1954, p. 597-601; disc., p. 601-602.

X-ray study of very thin sheets. Pole figures, graph, micrograph. 3 ref. (M26, U)

401-M. (French.) **A Metallographic Study of Uranium Hydride Inclusions in Metallic Uranium.** H. Mogard and G. Cabane. *Revue de métallurgie,* v. 51, no. 9, Sept. 1954, p. 617-622.

Data for uranium-hydrogen equilibria obtained by studying inclusions produced by heating specimens in a high hydrogen pressure. Micrographs, graphs. 13 ref. (M27, U)

402-M. (Italian.) **Research With the Electron Microscope on the Structure of Copper Electrodeposited From a Solution of Fluoborate.** G. Bianchi. *Metallurgia italiana,* v. 46, nos. 7-8, July-Aug. 1954, p. 251-256.

Effects of current density on crystalline shapes. Diagram, micrographs. 7 ref. (M27, M26)

403-M. (Polish.) **Structures of Chilled Iron Rolls.** J. Jastrzebska and W. Haczewski. *Prace Instytutow Ministerstwa Hutnictwa,* v. 6, no. 4, 1954, p. 157-169.

Optimum microstructures established for core and chilled layers for working conditions prevailing in Polish and German rolling practice. Tables, micrographs, graphs, diagram. 14 ref. (M27, CI)

404-M. A High-Resolution Evaporated-Carbon Replica Technique for the Electron Microscope. D. E. Bradley. *Institute of Metals, Journal,* v. 83, Sept. 1954, p. 35-38 + 2 plates.

Two-stage replica technique using an intermediate Formvar film. Resolution is better than 50 A. Diagrams, micrographs. 9 ref. (M21)

405-M. The Lattice Spacings of Binary Tin-Rich Alloys. J. A. Lee and G. V. Raynor. *Physical Society, Proceedings,* v. 67, no. 418B, Oct. 1954, p. 737-747.

Variation of structures with composition of solid solutions in tin of antimony, bismuth, lead, indium, cadmium, zinc and mercury. Graphs, tables, diagrams. 12 ref. (M26, Sn, Sb, Bi, Pb, In, Cd, Zn, Hg)

406-M. Apparatus for X-Ray Diffraction Studies of Metals Under Controlled Stress at Elevated Temperature. L. S. Birks. *Review of Scientific Instruments,* v. 25, Oct. 1954, p. 963-966.

Geiger-counter X-ray spectrometer. Construction details. Photographs, diagrams. 6 ref. (M22)

407-M. Contribution to the System Molybdenum-Silicon. R. Kieffer and E. Cerwenka. *Henry Brutcher, Altadena, Calif., Translation no.* 2960, 12 p. (From *Zeitschrift für Metallkunde,* v. 43, no. 4, 1952, p. 101-105.)

Previously abstracted from original. See item 254-M, 1952. (M24, Mo, Si)

408-M. The Structure of Titanium-Copper and Titanium-Tungsten Alloys. W. Trzebiatowski, J. Berak, J. Niemiec and T. Romotowski. *Henry Brutcher, Altadena, Calif., Translation no.* 2990, 2 p. (From *Roczniki Chemii,* v. 25, no. 4, 1951, p. 516-517.)

Results of an investigation based on microscopic and X-ray studies. 4 ref. (M26 M27 Ti, Cu, W)

409-M. Structure and Homogeneity Boundaries of Tantalum Carbide. V. I. Smirnova and B. F. Ormont. *Henry Brutcher, Altadena, Calif., Translation no.* 3376, 9 p. (From *Doklady Akademii Nauk SSSR,* v. 94, no. 3, 1954, p. 557-560.)

Previously abstracted from original. See item 304-M, 1954. (M26, M27, Ta)

410-M. (French.) **Structure of Ingot Molds in Steel Plants.** Michel Ferry. *Fonderie,* 1954, no. 103, Aug., p. 4070-4077.

Study of variation of quantities of pearlite and ferrite in cast iron molds at various locations in the mold. Micrographs, tables, drawings. (M27, CI)

411-M. (Book.) **Structure Reports for 1950.** A. J. C. Wilson, editor. v. 13. 644 p. 1954. NV.A. Oosthoek's Uitgevers MIJ. Utrecht, Holland. 80 Dutch florins.

Published for the International Union of Crytallography. Sections include metals, inorganic and organic compounds. (M26)

N

Transformations and Resulting Structures

417-N. Subcritical Decomposition of Carbide Phase in Some Low-Carbon Silicon Steels. E. D. Harry. *Iron and Steel Institute, Journal,* v. 178, Oct. 1954, p. 109-112.

Graphitization tests on three carbon steels with 1.8, 2.3 and 3.4% silicon. Effects of cold rolling, annealing atmosphere, specimen size and nature of surface. Tables. 11 ref. (N8, CN)

418-N. Phase Transformations in Titanium-Rich Alloys of Iron and Titanium. D. H. Polonis and J. Gordon Parr. *Journal of Metals,* v. 6, Oct. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Oct. 1954, p. 1148-1154.

High-purity alloys of titanium and iron, made by a technique of levitation melting, investigated with particular reference to martensite formation and decomposition in the hypo-eutectoid range. Photographs, graphs, micrographs. 15 ref. (N6, N9, Ti, Fe)

419-N. Delta Ferrite-Austenite Reactions and the Formation of Carbide, Sigma, and Chi Phases in 18 Chromium-8 Nickel-3.5 Molybdenum Steels. H. C. Vacher and C. J. Bechtoldt. *Journal of Research, National Bureau of Standards,* v. 53, Aug. 1954, p. 67-76.

Metallographic study of effect of chemical composition of the delta and gamma phases, and of the amount of delta, on the formation of carbide, sigma and chi phases. Tables, micrographs, X-ray diffraction patterns, graph. 7 ref. (N6, Cr, Mo, Ni)

420-N. The Austenite-Martensite Transformation. T. Ko. *Metallurgia,* v. 50, no. 299, Sept. 1954, p. 122-124.

Survey of work at Birmingham University from 1947-1953. 12 ref. (N8, ST)

421-N. Structural Transformations During the Aging of Aluminum-Copper-Magnesium Alloys. Yu. A. Bagaryatskii. *Henry Brutcher, Altadena, Calif., Translation no.* 2701, 9 p. (From *Zhurnal Tekhnicheskoi Fiziki,* v. 20, no. 4, 1950, p. 424-427.)

Results of X-ray analysis of single crystals of alloys after quenching and natural and artificial aging. Diagrams. 7 ref. (N7, Al, Cu, Mg)

422-N. Diffusion of Cobalt, Chromium, and Tungsten in Iron and Steel. P. L. Gruzin. *Henry Brutcher, Altadena, Calif., Translation no.* 3331, 8 p. (From *Doklady Akademii Nauk SSSR,* v. 94, no. 4, 1954, p. 681-684.)

Previously abstracted from original. See item 211-N, 1954. (N1, Co, Cr, W, Fe, ST)

423-N. Crystallographic Relationships in the Transformation of Iron. H. Neerfeld. *Henry Brutcher, Altadena, Calif., Translation no.* 3341, 12 p. (From *Archiv für das Eisenhüttenwesen,* v. 23, nos. 11-12, 1952, p. 471-473.)

Previously abstracted from original. See item 47-N, 1953. (N8, Fe)

424-N. (English.) **Inclusions in Iron Crystals Obtained by Recrystallization.** T. Smith. *Acta Metallurgica,* v. 2, no. 5, Sept. 1954, p. 647-654.

Small iron crystals included in large grains were usually exact twins of the large grain. Graphs, table, Laue photographs, diagrams. 17 ref. (N5, Fe)

425-N. (English.) **On Self-Diffusion in Cubic Metals.** F. S. Buffington and Morris Cohen. *Acta Metallurgica,* v. 2, no. 5, Sept. 1954, p. 660-666.

Theoretical derivation of constants relating selfdiffusion to temperature. Tables. 30 ref. (N1)

426-N. (German.) **Contribution to the Problem of Diffusion in Columnar Grains in Steel.** Hermann Schumann. *Metallurgie und Giessereitechnik,* v. 4, no. 8, Aug. 1954, p. 366-367, 359.

Columnar structure shown to have harmful effect on adherence of nitride layers due to tensile stresses caused by greater specific volume of Fe_4N segregated in grain boundaries parallel to the surface. Photograph, micrographs. 4 ref. (N1, Q25, AY)

427-N. (German.) **Reaction of Silver-Palladium Alloys With Sulfur at Elevated Temperature.** Ernst Raub, Bernhard Wullhorst, and Werner Plate. *Zeitschrift für Metallkunde,* v. 45, no. 9, Sept. 1954, p. 533-537.

Formation of brittle Ag_2Pd_3S and Ag_2S crystals. Photographs, micrographs, constitution diagram, table, interference diagrams. 10 ref. (N11, Ag, Pd)

428-N. (German.) **Change in Dimensions of Diffusion Specimens.** Wolfgang Seith and Rudolf Ludwig. *Zeitschrift für Metallkunde,* v. 45, no. 9, Sept. 1954, p. 550-554.

Effect of mutual diffusion of weld-joined metals on their dimensions in longitudinal and transverse direction over extended span of time. Graphs, diagram, micrographs. 8 ref. (N1, K general)

429-N. (Hungarian.) **Diffusion and Its Role in Casting.** Janos Prohaszka. *Ontöde,* v. 5, no. 8, Aug. 1954, p. 174-180,

Mechanism of diffusion, carbon and gas diffusion in iron castings, diffusion and tempering. Diagrams, graphs, photographs, table. 10 ref. (N1, E25, J29, CI)

430-N. (Russian.) **Formation of Graphite on the Surface of Steel During Heat Treatment Under Vacuum.** E. Z. Graifer and I. V. Salli. *Doklady Akademii Nauk SSSR,* v. 97, no. 4, Aug. 1, 1954, p. 663-665.

Importance of silicon as alloying element in graphitization of steels and wrought irons. Micrographs, graph. 5 ref. (N8, Fe, ST)

431-N. Effect of Certain Elements on the Graphitization of Steel. R. J. Fiorentino, A. M. Hall and J. H. Jackson. *ASME, Transactions,* v. 76, Oct. 1954, p. 1123-1129; disc., p. 1129-1130.

Graphitization process proceeds by means of a nucleation and growth mechanism, and a time rate of nucleation may possibly be involved. Tables, graphs. 16 ref. (N8, Al, N, Cr, Mn, Si, S, P, ST)

432-N. (English.) **The Dependence of the Thermal Vibration of the Cl-Ion in NaCl, KCl, and RbCl Crystals on the Crystallographic Directions.** U. Korhonen. *Ata Metallurgica,* v. 2, no. 5, Sept. 1954, p. 713-717.

Possibility of measuring the anharmonic part of thermal vibration by X-rays. Tables, graph. 5 ref. (N10)

433-N. (English.) **A Supplement to Investigation of Equilibrium Diagram of Fe-As-C System. (On Magnetic Transformation Point of Fe-As and Fe-As-C System.)** Hiroshi Sawamura and Toshisada Mori. *Memoirs of the Faculty of Engineering, Kyoto University,* v. 16, no. 3, July 1954, p. 182-189.

Includes graphs, table. 3 ref. (N11, M24, As, Fe)

434-N. (French.) **Recrystallization of Uranium After Passing Through the Transformation Points.** M. Pruna, P. Lehr and G. Chaudron. *Revue de métallurgie,* v. 51, no. 9, Sept. 1954, p. 589-596.

Dilatometric and metallographic studies. Table, graphs, micrographs, diffraction patterns. 3 ref. (N5, U)

435-N. (French.) **A Metallographic Study of the Beta-to-Alpha Transformation of Uranium in Stabilized Uranium-Chromium Alloys.** B. W. Mott and H. R. Haines. *Revue de métallurgie,* v. 51, no. 9, Sept. 1954, p. 614-616.

Mechanisms of transformation at room temperature after quenching from 720° C. Table, micrographs. 4 ref. (N6, U)

436-N. (German.) **Gas Release and Gas Permeability of Metals Used for Vacuum Tanks.** E. Waldschmidt. *Metall,* v. 8, nos. 19-20, Oct. 1954, p. 749-758.

Saturation pressure of different substances as a function of temperature, gas adsorption, getter effect, solubility and diffusion of gases in metals, and permeability of atomic and molecular gases. Graphs, tables. 57 ref. (N1, N15)

437-N. (Russian.) **The So-Called "Direct Decomposition" of Cementite.** K. P. Bunin. *Liteinoe Proizvodstvo,* 1954, no. 6, Sept., p. 23-26.

Microstructure shows forms in which graphitic inclusions appear, following various heat treatments. Micrographs, diagram. 17 ref. (N8, M27, ST)

438-N. Interpreting Graphitization for Power Engineers. Helmut Thielsch. *Combustion,* v. 26, Oct. 1954, p. 49-55.

Method for evaluating severity of graphitization and recommendations and techniques for rehabilitation. Micrographs, photographs, diagrams. (N8, Fe, Mo, Cr, AY)

439-N. The Ageing Characteristics of Some Ternary Aluminium-Copper-Magnesium Alloys With Copper: Magnesium Weight Ratios of 7:1 and 2.2:1. H. K. Hardy. *Institute of Metals, Journal,* v. 83, Sept. 1954, p. 17-34.

Hardness versus aging-time curves were obtained at 30, 110, 130, 165, 190, 220, 240 and 260° C. Form of curves explains effects of increasing magnesium on hardness. Graphs, tables. 96 ref. (N7, Q29, Al)

440-N. Reversibility of Martensite Transformations During the Heating of Iron-Carbon Alloys. V. N. Gridnev and V. I. Trefilov. *Henry Brutcher, Altadena, Calif., Translation no.* 3385, 6 p. (From *Doklady Akademii Nauk SSSR,* v. 96, no. 4, 1954, p. 741-743.)

Previously abstracted from original. See item 325-N, 1954. (N8, ST)

441-N. (English.) **Electron Diffraction Study on the Ordered Alloy CuAu.** Shiro Ogawa and Denjiro Watanabe. *Physical Society of Japan, Journal,* v. 9, no. 4, July-Aug. 1954, p. 475-488.

Shows that two phases coexist in the ordered state for alloys in the 1:1 region of composition. Diffraction patterns, diagrams, table, graph. 24 ref. (N10, Cu, Au)

442-N. (English.) **Order-Disorder Transitions in A-BC Ternary Alloys With the Plane Square or the Body-Centered Cubic Lattice.** Sukeaki Hosoya. *Physical Society of Japan, Jour-*

nal, v. 9, no. 4, July-Aug. 1954, p. 489-495.

Calculations show four types of ordered states can appear. Factors which determine type appearing. Graphs, diagrams, tables. 8 ref. (N10)

443-N. (English.) **Study on the Crystallization Process of Polished Layers of Metals by Electron Diffraction and Microscopy.** Kozo Nonaka and Kazutake Kohra. *Physical Society of Japan, Journal*, v. 9, no. 4, July-Aug. 1954, p. 512-520.

Crystal growth of Beilby layers of copper, nickel and gold at various temperatures. Diagrams, diffraction patterns, tables, graphs, micrographs. 20 ref. (N12, Cu, Ni, Au)

444-N. (French.) **On the "Nuclei" of Spheroidal Graphite.** Adalbert Wittmoser. *Fonderie*, 1954, no. 104, Sept., p. 4128-4145; disc., p. 4146.

Literature review and experimental observations on existence of "nuclei". Micrographs, tables, diagrams, charts. 64 ref. (N2, CI)

445-N. (French.) **Experimental Results on the Behavior of Nickel Cathodes Heated in a Vacuum.** J. Richard. *Vide*, v. 9, no. 51, May, 1954, p. 28-32.

Analysis of gases and volatile material evolved from nickel when heated in a vacuum. Tables, graphs. (N15, Ni)

P

Physical Properties and Test Methods

551-P. Heat Content of Lead From 0 to 900°, and the Heat of Fusion. Thomas B. Douglas and James L. Dever. *American Chemical Society, Journal*, v. 76, Oct. 5, 1954, p. 4824-4826.

Compared with earlier studies. Tables, graph. 18 ref. (P12, Pb)

552-P. Permanent Magnets. *Edgar Allen News*, v. 33, Sept. 1954, p. 203-204.

Magnetic materials include Imperial permanent magnet steel, 6% tungsten, Hymax cobalt maget steels and Nial nickel-iron-aluminum magnet alloys. Photographs, graph. (To be continued.)
(P16, W, Co, Ni, Fe, Al)

553-P. Low-Energy Electron Diffraction Investigation of Chemisorbed Gases on the (100) Faces of Copper and Nickel Single Crystals. R. E. Schlier and H. E. Farnsworth. *Journal of Applied Physics*, v. 25, Oct. 1954, p. 1333-1336.

Equipment, procedures and results. Diagram, graphs. 6 ref. (P13, M22, Cu, Ni)

554-P. Heat Content of Molybdenum Disilicide From 0° to 900° C. Thomas B. Douglas and William M. Logan. *Journal of Research, National Bureau of Standards*, v. 53, Aug. 1954, p. 91-93.

Derivation of equation for values of relative heat content, heat capacity and relative entropy. Tables, graph. 3 ref. (P12, Mo, Si)

555-P. Properties of Zinc-, Copper-, and Platinum-Doped Germanium. W. C. Dunlap, Jr. *Physical Review*, v. 96, ser. 2, Oct. 1, 1954, p. 40-45.

Hall effect and resistivity measurements on single crystals. Diagram, graphs. 13 ref. (P15, Ge)

556-P. Optical Properties of Lead Telluride. Marvin E. Lasser and Henry Levinstein. *Physical Review*, v. 96, ser. 2, Oct. 1, 1954, p. 47-52.

Optical constants of films as function of both temperature and oxygen content. Graphs, diagrams. 18 ref. (P17, L, Pb, Te)

557-P. The Temperature Variation of Susceptibility of Tantalum. F. E. Hoare, J. S. Kouvelites, J. C. Matthews and J. Preston. *Physical Society, Proceedings*, v. 67, no. 417B, Sept. 1954, p. 728-730.

Magnetic susceptibility for range 0 to 2000° K. Graphs. 3 ref. (P16, Ta)

558-P. Measurement of the Electrical Resistance of Metals and Alloys at High Temperatures. P. Chiotti. *Review of Scientific Instruments*, v. 25, Sept. 1954, p. 876-883.

Method and apparatus to measure change in electrical resistance with temperature of refractory metals or alloys up to their melting point. Photographs, diagrams, circuit diagrams. 9 ref. (P15)

559-P. The Magnetic Anisotropy of Cobalt. W. Sucksmith and J. E. Thompson. *Royal Society, Proceedings*, v. 225, ser. A, Sept. 14, 1954, p. 362-375.

Measurements on variation of intensity of magnetization for single-crystal specimens cut along appropriate crystal axes, both for the hexagonal close-packed and face-centered cubic cobalt. Graphs, diagram, table. 20 ref. (P16, Co)

560-P. Effect of Nitrogen Upon Surface Tension and Crystallization of Austenitic Steels. N. S. Kreshchanovskii, V. I. Prosvirin and R. P. Zaletaeva. *Henry Brutcher, Altadena, Calif., Translation no.* 3372, 6 p. (From *Liteinoe Proizvodstvo*, v. 5, no. 1, 1954, p. 23, 24.)

Influence of nitrogen upon surface tension and primary crystallization pattern of various austenitic steels. Graph, photographs, table. 7 ref. (P10, N12, SS)

561-P. (English.) **Formation Energies of Vacancies in Copper and Gold.** C. J. Meechan and R. R. Eggleston. *Acta Metallurgica*, v. 2, no. 5, Sept. 1954, p. 680-683.

Experimental data for temperatures up to 950° C. give values of 0.90 e.v. for copper and 0.67 e.v. for gold. Tables, graphs. 14 ref. (P10, Cu, Au)

562-P. (German.) **Threshold Limit of the Current of the Superconductive Alloy Lead-Bismuth in External Magnetic Fields.** P. Grassmann and L. Rinderer. *Helvetica Physica Acta*, v. 27, no. 4, Aug. 1954, p. 309-312.

Investigation of dependence of induced current on strength of longitudinal or transverse magnetic fields. Deviations from analogous of pure metals. Graphs. 8 ref. (P16, Pb, Bi)

563-P. (German.) **The Optical Behavior of Metals at High Temperatures.** Günther Grass. *Zeitschrift für Metallkunde*, v. 45, no. 9, Sept. 1954, p. 538-547.

Theoretical and experimental study of the effect of temperature on the light-reflecting power of iron, nickel, cobalt, copper and manganese at temperatures up to 1200° C. Table, diagrams, graphs, photographs. 24 ref. (P17, Fe, Ni, Co, Cu, Mn)

564-P. (Russian.) **Investigation of the Magnetostriction of an Iron-Nickel Alloy in Strong Magnetic Fields.** G. P. D'iakov and R. A. Reznikova. *Doklady Akademii Nauk SSSR*, v. 97, no. 4, Aug. 1, 1954, p. 633-634.

Studies on wire composed of 41% iron and 59% nickel. Graphs. 6 ref. (P16, Fe, Ni)

565-P. (Russian.) **Thermal Capacity of the Zeta-Phase of the Iron-Silicon System.** N. N. Serebrennikov and P. V. Gel'd. *Doklady Akademii Nauk SSSR*, v. 97, no. 4, Aug. 1, 1954, p. 695-698.

Experimental data for range of 0 to 1200° C. Table, graphs. 2 ref. (P12, M24, Fe, Si)

566-P. (Russian.) **Magnetostriction of Ferromagnetic Manganese Alloys.** D. I. Volkov. *Doklady Akademii Nauk SSSR*, v. 97, no. 5, Aug. 11, 1954, p. 809-811.

Effect of degree of ordering of atoms on saturation magnetostriction and saturation magnetism. Graphs. 4 ref. (P16, Mn)

567-P. (Russian.) **Certain Patterns in the Magnitude of the Thermal Conductivity of Semiconductors.** A. V. Ioffe and A. F. Ioffe. *Doklady Akademii Nauk SSSR*, v. 97, no. 5, Aug. 11, 1954, p. 821-822.

Effect of atomic and ionic crystal lattice structure on thermal conductivity of various halide, germanium, silicon, indium and antimony semiconductors. Tables, graphs. 2 ref. (P11, M26, Ge, Si, In, Sb)

568-P. Liquid Metals. I. The Surface Tension of Liquid Sodium: the Vertical-Plate Technique. C. C. Addison, D. H. Kerridge and J. Lewis. *Chemical Society, Journal*, 1954, Aug., p. 2861-2866.

Liquid sodium in argon atmosphere wetted zinc between 100 and 200° C. Copper and molybdenum were not wetted. Diagrams, tables, graphs. 10 ref.
(P10, Na, Cu, Mo, Zn)

569-P. Physical Chemistry of Steel. I. Theoretical Bases. J. A. Kitchener. *Iron & Steel*, v. 27, Oct. 1954, p. 473-478.

Thermodynamics and structure of solutions in liquid iron during the process of steelmaking. Graphs. 4 ref. (To be continued.)
(P12, D general, ST)

570-P. (English.) **The Electrical Resistivity of Cu-Ni Alloys and Matthiessen's Rule.** Yoshio Shibuya. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 6, no. 3, June 1954, p. 199-206.

Resistivity versus composition curves for 23 and −183° C. are parabolic. Matthiessen's rule does not hold for copper-rich alloys. Table, diagram, graphs. 16 ref.
(P15, Cu, Ni)

571-P. (English.) **Statistico-Thermodynamical Studies on the Fundamental Reactions Concerning Steel-Making. II. The Equilibrium Relationship Between Oxygen and Carbon in Liquid Iron Under Various Pressures of CO Gas.** Sakae Takeuchi. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 6, no. 3, June 1954, p. 207-219.

Computations show that departure from ideal solutions makes deoxidation by carbon possible only at low concentrations of carbon. Graphs. 11 ref. (P12, D general, ST)

572-P. (English.) **On the Solution-Body Phenomenon and Anisotropy of Solution Rate in Bismuth Crystals.** Mikio Yamamoto and Jiro Watanabé. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 6, no. 3, June 1954, p. 233-243.

Solution rates are more anisotropic in nitric acid than in a nitric-hydrochloric mixture. Graphs, tables, diagrams, photographs. 17 ref. (P13, Bi)

573-P. (French.) **The Present State of Research on the Structure of Molten Silicates.** J. O'M. Bockris and J. D. Mackenzie. *Revue de métallurgie*, v. 51, no. 9, Sept. 1954, p. 658-664.

Electrical conductivity, transport number and viscosity of various silicates up to 1800° C. Probable mech-

anism of effects of metallic oxides on silica lattice. Diagrams, graphs. 13 ref. (P12, P10)

574-P. (Russian.) **Peculiarities of the Magnetostrictive Properties of Manganese-Tin Ferromagnetic Alloys.** D. I. Volkov and V. I. Leont'ev. *Doklady Akademii Nauk SSSR*, v. 97, no. 6, Aug. 21, 1954, p. 995-997.

Theoretical analysis of relations between longitudinal and transverse magnetostriction. Graphs. 8 ref. (P16, Mn, Sn)

575-P. (Russian.) **Optical Properties of Metals.** V. L. Ginzburg. *Doklady Akademii Nauk SSSR*, v. 97, no. 6, Aug. 21, 1954, p. 999-1002.

Theoretical and mathematical relations. Table. 7 ref. (P17, Au, Ag, Cu, Sn)

576-P. (Russian.) **Theory of the Ball Effect in Ferromagnetics.** N. S. Akulov and A. V. Cheremushkina. *Doklady Akademii Nauk, SSSR*, v. 98, no. 1, Sept. 1, 1954, p. 35-38.

Equations expressing relations of uneven effects to magnetic field and intensity of magnetization of monocrystals and polycrystals. Graphs. 6 ref. (P15, P16)

577-P. (Russian.) **Kinetic Equation for Electrons in Metals in Strong Fields.** V. P. Shabanskii. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 27, no. 2(8), Aug. 1954, p. 142-146.

Analysis of collisions with the variation in absolute magnitude of electron impulse. 2 ref. (P15)

578-P. (Russian.) **Deviations From Ohm's Law in Metals.** V. P. Shabanskii. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 27, no. 2(8), Aug. 1954, p. 147-155.

Large current densities produce erroneous estimates in current strength due to energy loss from electron collisions with lattice. 19 ref. (P15)

579-P. (Russian.) **Temperature Dependence of the Magnetostriction of Ferromagnetic Alloys.** D. I. Volkov and V. I. Chechernikov. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 27, no. 2(8), Aug. 1954, p. 208-214.

Equipment and measuring methods. Graphs. 14 ref. (P16, Ni, Cu, Mn, Fe)

580-P. (Russian.) **Surface Tension and Heat of Evaporation of Mercury, Antimony, Bismuth, and Arsenic.** S. N. Zadumkin. *Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki*, v. 27, no. 2(8), Aug. 1954, p. 261-262.

Calculated values agree with experimental. Table. 2 ref. (P10, P12, Sb, Hg, Bi, As)

581-P. Metallurgical Effects of Ultrasonic Waves. Egon A. Hiedemann. *Acoustical Society of America, Journal*, v. 26, Sept. 1954, p. 831-842.

Survey includes vibration treatment of melts, mechanical vibrators, electromechanical transducers, induced electrical currents, ultrasonic treating, grain size, dispersion and rate processes. Diagrams, drawings, micrographs, graphs, macroetchings. 121 ref. (P10, S13)

582-P. Lattice Dynamics of Body-Centered and Face-Centered Cubic Metallic Elements. II. Jules de Launay. *Journal of Chemical Physics*, v. 22, Oct. 1954, p. 1676-1677.

A numerical table permits easy calculation of the Debye characteristic temperature of any cubic metallic element at 0° K. Tables. 5 ref. (P12, M22)

583-P. Optical and Photo-Electrical Properties of Indium Antimonide. D. G. Avery, D. W. Goodwin, W. D. Lawson and T. S. Moss. *Physical Society, Proceedings*, v. 67, no. 418B, Oct. 1954, p. 761-767.

Reflection and transmission measurements of InSb from 0.7 to 14 μ at temperatures of − 183 to 226° C. Photosensitivity extends to longer wave lengths than for any other known material. Graphs. 7 ref. (P17, P15, In, Sb)

584-P. The Vapour Pressure of Calcium. I. P. E. Douglas. **II.** D. H. Tomlin. *Physical Society, Proceedings*, v. 67, no. 418B, Oct. 1954, p. 783-794.

Relation of vapor pressure to absolute temperature. Diagrams, graphs, tables. 12 ref. (P12, Ca)

585-P. (English.) **On the Variational Calculation of the Activation Energy of Dislocation.** Akira Sugiyama. *Physical Society of Japan, Journal*, v. 9, no. 4, July-Aug. 1954, p. 460-464.

More rigid colculation shows Cottrell's approximation does not agree with experimental data. Graphs, tables. 4 ref. (P12, Q24)

586-P. (English.) **The Magnetostriction Constants of Silicon Steel. I.** Hideo Takaki and Yoji Nakamura. *Physical Society of Japan, Journal*, v. 9, no. 4, July-Aug. 1954, p. 507-511.

Tests on single crystal specimens with 0.7 and 1.8% silicon show Kaya's law of residual magnetization holds for these alloys. Tables, graphs. 14 ref. (P16, AY)

587-P. (German.) **Artificial Elements. I.** G. Herrmann. *Chemische Technik*, v. 6, no. 9, Sept. 1954, p. 494-502.

Transmutation of elements, study of radioactive and chemical properties of technetium, promethium, astatine and francium. Tables. (To be continued.) (P13, At, Fr, Pm, Te)

588-P. (German.) **The Stability of Superconducting State.** H. Koppe. *Zeitschrift für Naturforschung*, v. 9a, no. 9, Sept. 1954, p. 724-726.

Cylindrical region inside superconductor is not stable thermodynamically. 4 ref. (P12, P15)

589-P. (German.) **Coefficient of Vaporization of Liquid Potassium.** Kurt Neumann. *Zeitschrift für physikalische Chemie (Frankfurt)*, v. 2, nos. 3-4, Oct. 1954, p. 215-228.

Reviews of vaporization of liquids, equipment and method for determination; evaluation of results show that the vaporization coefficient of molten potassium in vacuum is unaffected by temperature. Tables, diagrams, photograph, graphs. 19 ref. (P12, K)

590-P. (Russian.) **Certain Questions of the Quantum Mechanics Theory of the Ferromagnetism of Ferrites and Antiferromagnetism. I. Critical Review of Existing Theories.** S. V. Vonsovskii. **II. Quantum Mechanics Theory of Ferromagnetic Ferrites.** S. V. Vonsovskii and Iu. M. Seidov. **III. Antiferromagnetism of Transition Metals.** A. A. Berdyshev and S. V. Vonsovskii. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 18, no. 3, 1954, p. 312-338.

Antiferromagnetic bond between crystal ions. Temperature dependence of spontaneous magnetization. Calculation of magnetic properties by consideration of valence electrons and electrons from incomplete inner shells of the atoms. Diagrams. 33 ref. (P16, Co, Fe, Ni)

591-P. (Book.) **Progress in Metal Physics.** Bruce Chalmers and R. King, editors, v. 5, 324 p. 1954. Interscience Publishers, Inc., 250 Fifth Ave., New York, N. Y. $9.50.

Consists of five articles individually abstracted. (P general, M general, N general)

592-P. (Book.) **Thermal Conductivity of Metals and Alloys at Low Temperatures.** Robert L. Powell and William A. Blanpied. National Bureau of Standards Circular 556. 68 p. Government Printing Office, Washington 25, D. C. $0.50.

Useful but widely scattered data. Includes tables of measured values of thermal conductivity from room temperature down to approximately 0° K. (P11)

Q Mechanical Properties and Test Methods; Deformation

1034-Q. Minimum Life in Fatigue. A. M. Freudenthal and E. J. Gumbel. *American Statistical Association, Journal*, v. 49, no. 267, Sept. 1954, p. 575-597.

Statistical study of probability of a specimen surviving a certain number of repetitions of a specified stress-cycle in a given testing procedure. Graphs, tables. 7 ref. (Q7)

1035-Q. Limit Analysis and Design. D. C. Drucker. *Applied Mechanics Reviews*, v. 7, Oct. 1954, p. 421-423.

Determination of load-carrying capacity of given design for machine and structural elements and assemblies. Theorems derived for an elastic ideally plastic material. 43 ref. (Q21, Q23)

1036-Q. Method of Preventing Fatigue Failure of Steel Bolts. R. H. Cross and G. M. Norris. *Engineer*, v. 198, Sept. 24, 1954, p. 410-411.

Locking two nuts together can prevent fatigue failure of a bolt in tension by effecting a reduction in the alternating load borne by the peak-loaded thread immediately inside the inner face of the inner nut. Graphs, diagrams, tables, photographs. 4 ref. (Q7, K13, ST)

1037-Q. On the Graphical Solution of Transient Vibration Problems. R. E. D. Bishop. *Institution of Mechanical Engineers, Proceedings*, v. 168, no. 10, 1954, p. 299-312; disc., p. 312-322.

Simplified approach to multi-degree-of-freedom systems leading to the treatment of transient loading of beams by moving and moving-and-varying loads. Diagrams, tables, graphs. 25 ref. (Q23)

1038-Q. Compression Wave Velocity Experiments With Copper. Jacob Savitt, R. H. Stresau and L. E. Starr. *Journal of Applied Physics*, v. 25, Oct. 1954, p. 1307-1310.

Method of measuring wave velocities in metals. Photographs, graphs. 7 ref. (Q28, Cu)

1039-Q. Quantitative Substructure and Tensile-Property Investigations of Nickel Alloys. Betsy Ancker and Earl R. Parker. *Journal of Metals*, v. 6, Oct. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Oct. 1954, p. 1155-1162.

Small-angle dislocation-boundary density of nickel and some of its alloys investigated as function of strength and results interpreted in terms of dislocation theory. Graphs, tables, micrographs. 7 ref. (Q23, Q24, Ni)

1040-Q. The Plastic Deformation of Metals. *Metallurgia*, v. 50, no. 299, Sept. 1954, p. 117-121.

Progress of research on mechanics of forming and shaping metals. Photographs, micrograph. (Q24)

1041-Q. Micro-Indentation Hardness: Its Elastic, Plastic and Fracture Components. P. Grodzinski. *Metallurgia*, v. 50, no. 299, Sept. 1954, p. 125-131.

Principles and practices in deter-

mining and defining hardness. Graphs, micrographs, diagrams, table. 26 ref. (Q29)

1042-Q. A New Instrument for Measuring Stress in Electrodeposits. Joseph B. Kushner. *Plating*, v. 41, Oct. 1954, p. 1146-1153; disc., p. 1153.
Description and theory of Stressometer. Data for various metal deposits. Diagrams, tables, graphs. 9 ref. (Q25, L17)

1043-Q. Stress in Chromium Deposits. J. E. Stareck, E. J. Seyb and A. C. Tulumello. *Plating*, v. 41, Oct. 1954, p. 1171-1180; disc., p. 1180-1182.
Details of spiral contractometer. Stresses in deposits from various baths on copper and steel. Effects of heating. Photographs, micrograph, tables, diagram, graphs. 11 ref. (Q25, L17, Cr)

1044-Q. The Influence of Metal Structure on Properties of Investment Castings. II. Nicholas J. Grant. *Precision Metal Molding*, v. 12, Oct. 1954, p. 92-95.
Value of hot molds. Photographs. (Q general, M27, E15)

1045-Q. Frictional Adhesion of Metal to Glass, Quartz, and Ceramic Surfaces. Richard B. Belser. *Review of Scientific Instruments*, v. 25, Sept. 1954, p. 862-864.
Experimental work on titanium, zirconium and other metals, applications in producing decorative designs, glass-to-metal joints, electric conductors, and in glass cutting. Tables, micrographs. (Q9, K11, Ti, Zr)

1046-Q. Design of Extensometer for Creep Studies. Ben R. Gossick. *Review of Scientific Instruments*, v. 25, Sept. 1954, p. 907-909.
An instrument which incorporates automatic and remote operation for irradiation studies over a wide range of extension for study of plastic flow under stress and deuteron bombardment. Circuit diagrams, photograph, graph. 2 ref. (Q3)

1047-Q. Radiation Effects on Structural Materials. C. R. Sutton and D. O. Leeser. Paper from "Nuclear Engineering". American Institute of Chemical Engineers, p. 208-221.
Significance of effects on mechanical and physical properties of metals in relation to design use. Diagrams, tables. 4 ref.
(Q general, P general)

1048-Q. A Study of the Room Temperature Ductility of Chromium. H. L. Wain, F. Henderson and S. T. M. Johnstone. Commonwealth of Australia, Dept. of Supply, Research and Development Branch, A.R.L./MET. 1, Apr. 1954, 33 p. + 8 plates.
Effects of small amounts of nitrogen, notches, recrystallization and temperature. Tables, photograph, diagram, reflection patterns, micrographs, graph. 26 ref. (Q23, Cr)

1049-Q. Hardness of Gamma Solid Solution in the Iron-Carbon System at High Temperature. K. A. Osipov and E. M. Miroshkina. *Henry Brutcher, Altadena, Calif., Translation no.* 3332, 5 p. (From *Doklady Akademii Nauk SSSR*, v. 94, no. 6, 1954, p. 1065-1067.)
Previously abstracted from original. See item 536-Q, 1954. (Q29, Fe)

1050-Q. Hardness of Martensite as Function of Its Carbon Content. M. Sagisman. *Henry Brutcher, Altadena, Calif., Translation no.* 3365, 5 p. (From *Archiv für das Eisenhüttenwesen*, v. 25, nos. 5-6, 1954, p. 271-272.)
Previously abstracted from original. See item 791-Q, 1954. (Q29, CN)

1051-Q. (English.) The Plastic Deformation of a Crystal in a Polycrystalline Aggregate. W. Boas and G. J. Ogilvie. *Acta Metallurgica*, v. 2, no. 5, Sept. 1954, p. 655-659.
Microscopic study shows that both interior and surface grains are deformed inhomogeneously. Data related to current theories. Micrographs. 18 ref. (Q24, Al, Cu)

1052-Q. (English.) Elastic Properties of Iron Whiskers. G. W. Sears, A. Gatti and R. L. Fullman. *Acta Metallurgica*, v. 2, no. 5, Sept. 1954, p. 727-728.
Unusual strength demonstrates a near-perfect crystalline structure. Micrographs. 8 ref. (Q21, M26, Fe)

1053-Q. (English.) Torsion of a Circular Shaft Press-Fitted With a Collar. Hideo Saito. *Technology Reports, Tohoku University*, v. 18, 1954, p. 178-186.
Mathematical analysis of stress distribution. Diagram, table, graphs. 3 ref. (Q1, Q25)

1054-Q. (English.) On a Solution of Torsion Problem of Rectangular Cross-Section by Trefftz's Method. Miki Ishii. *Technology Reports, Tohoku University*, v. 18, 1954, p. 187-194.
Calculation of stress distribution. Graphs, table, diagrams. 6 ref. (Q1, Q25)

1055-Q. (German.) Hardness Measurements on Electrodeposits. II. Albert Keil and Elisabet Merkle. *Metalloberfläche*, Ausgabe A, v. 8, no. 9, Sept. 1954, p. 129-131.
Heavy deposit of rhodium gave extreme differences in hardness between deposit and base metal. Penetration of diamond is limited for accuracy to less than 1/10 of deposit thickness. Graphs, micrograph, diagram. 9 ref. (Q29, L17, Rh)

1056-Q. (German.) The Effect of Hydrogen on the Yield Point in Soft Steel. Hermann Schumann. *Metallurgie und Giessereitechnik*, v. 4, no. 8, Aug. 1954, p. 367-369.
Explanation based on hypothesis of hydrogen-atom clouds. Graphs. 5 ref. (Q23, CN)

1057-Q. (German.) Stress Measurements in Nonlinear Systems of Continuum Mechanics. H. Schlechtweg. *Naturwissenschaften*, v. 41, no. 17, Sept. 1954, p. 400.
Stress analysis of substances deviating from Hooke's law when slightly stressed. 8 ref. (Q25, Q21)

1058-Q. (German.) Dispersion of Double Refraction in Celluloid As a Measure of Plasticity by Photo-Elasticity. Ernst Mönch. *Zeitschrift für angewandte Physik*, v. 6, no. 8, Aug. 1954, p. 371-375.
Degree of plastic deformation determined with aid of two isochromatic pictures. Graphs, diagram, photographs. 7 ref. (Q24, Q25)

1059-Q. (German.) The Flow of Metals at High Temperatures. Alfred Seeger. *Zeitschrift für Metallkunde*, v. 45, no. 9, Sept. 1954, p. 521-527.
Review of literature on effects of lattice defects on the mechanical properties of crystals. Diagrams, micrographs, table, graphs. 40 ref.
(Q general, M26)

1060-Q. (German.) Instrument for Measuring Static and Alternating Elongation as Well as Materials Damping. W. Krägeloh. *VDI Zeitschrift des Vereines deutscher Ingenieure*, v. 96, no. 25, Sept. 1, 1954, p. 864-866.
Instrument with two strain gages for simultaneous recording of elongation, applied load and damping properties of statically or dynamically stressed materials. Circuit diagram, table, graphs, photographs, oscillograms. 4 ref. (Q8, Q25)

1061-Q. (Norwegian.) Gases in Metals. Nils Christensen. *Teknisk Ukeblad*, v. 101, no. 32, Sept. 9, 1954, p. 693-703.
Review of American and German literature on effects of oxygen, nitrogen and hydrogen in iron or steel on their respective properties. Methods of determining these gases in ferrous metals. Graphs, tables, photographs. 22 ref. (Q general, S11)

1062-Q. (Russian.) Investigation of the Relation Between the Force of Friction and "Elementary Forces". A. V. Bulgadaev. *Doklady Akademii Nauk SSSR*, v. 97, no. 5, Aug. 11, 1954, p. 805-808.
Effects of different loads on friction between dry and lubricated surfaces of various degrees of smoothness. Graphs. (Q9)

1063-Q. (Russian.) Optimum Microgeometry and Weight Loss Through Wear of Run-In Surfaces of a Steel-Bronze Combination. I. A. Kosenko. *Vestnik Mashinostroeniia*, v. 34, no. 8, Aug. 1954, p. 24-25.
Effects of original condition of bearing surfaces, running-in period, temperature and coefficient of friction. Graphs. (Q9, ST, Cu)

1064-Q. (Russian.) Variation of Mechanical Properties of Low-Carbon Steel in Relation to Conditions of Cooling After Heating. I. A. Nenaezdnikov. *Vestnik Mashinostroeniia*, v. 34, no. 8, Aug. 1954, p. 52.
Effects of cooling rate on 0.18% carbon steel using sheet and rod specimens. Tables.
(Q general, J26, CN)

1065-Q. (Russian.) Fatigue Strength of Steel Surface-Hardened by High-Frequency Heating by Mechanical and Tube Generators. P. A. Lankin. *Vestnik Mashinostroeniia*, v. 34, no. 8, Aug. 1954, p. 53-55.
Effects of induction heating variables and prior structure on mechanical properties of carbon steel. Diagrams, photographs, table. 6 ref. (Q7, J2, CN)

1066-Q. (Russian.) Effect of Shot-Peening on the Endurance Limits of Specimens Subjected to Repeated Shock Loads. M. A. Anuchin and Iu. A. Volkov. *Vestnik Mashinostroeniia*, v. 34, no. 8, Aug. 1954, p. 55-58.
Effects of shot-peening variables on strength of polished and unpolished specimens of alloy steel. Graphs, tables. 2 ref. (Q7, G23, AY)

1067-Q. (Russian.) Effect of Hardening by High-Frequency Current Upon the Strength of Splined Joints During Twisting. N. I. Pliuksne. *Vestnik Mashinostroeniia*, v. 34, no. 8, Aug. 1954, p. 59-61.
Torsion test data for various spline shapes. Tables, graphs, diagrams, photographs. (Q1, J2, ST)

1068-Q. (Russian.) Relation Between Temperature and the Decrement of Vibrations and the Modulus of Elasticity of Some Steels. M. M. Pisarevskii. *Vestnik Mashinostroeniia*, v. 34, no. 8, Aug. 1954, p. 61-65.
Experimental data for steels with various heat treatments. Graphs, table. 3 ref. (Q21, ST)

1069-Q. (Russian.) Heat Treatment and Creep Strength of Steel 1X13. S. K. Maksimov. *Vestnik Mashinostroeniia*, v. 34, no. 8, Aug. 1954, p. 65-67.
Composition, mechanical properties and microstructure of 14% chromium steel. Tables, graphs, micrographs. 3 ref.
(Q3, J general, M27, SS)

1070-Q. Stress-Rupture Properties of Some Chromium-Nickel Stainless-Steel Weld Deposits. R. D. Wylie, C. L. Corey and W. E. Leyda. *ASME, Transactions*, v. 76, Oct. 1954, p. 1093-1104; disc., p. 1104-1106.
High-temperature strength capacity of chromium-nickel stainless steel welded joints in power-boiler equipment. Tables, diagrams, graphs, micrographs. 9 ref. (Q4, SS)

1071-Q. Radioactive Isotopes for Measuring Piston Ring Wear. J. H.

Deterding and A. Dyson. *Engineer*, v. 198, Oct. 1, 1954, p. 442-445.

Raidoactive constituents; safety precautions; counting methods. Photographs, graphs, diagram, table. 2 ref. (Q9)

1072-Q. Determination of Loads in the Presence of Thermal Stresses. Samuel Levy. *Journal of the Aeronautical Sciences*, v. 21, Oct. 1954, p. 659-664.

Equations for determining axial load, shear load and bending moment from the output of gages located at specified positions on aircraft structures. Diagrams. 2 ref. (Q25)

1073-Q. The Creep of Aluminium During Neutron Irradiation. E. R. W. Jones, W. Munro and N. H. Hancock. *Journal of Nuclear Energy*, v. 1, Aug. 1954, p. 76-86 + 1 plate.

Includes photographs, diagrams, table, graphs. 3 ref. (Q3, P10, Al)

1074-Q. Brittle Failure of Steel Structures—Factors of Importance. M. E. Shank. *Metal Progress*, v. 66, Oct. 1954, p. 120-126.

Brittle fractures in steel plate structures result from a combination of stress (residual, locked-in, thermal or working—not necessarily impact), stress concentration and triaxiality at notches, cracks or defects in workmanship, and steel of composition, microstructure and treatment which gives a high transition temperature for tough-to-brittle type of fracture. Photograph, table, graphs. 5 ref. (Q26, Q23, ST)

1075-Q. Hydrogen Embrittlement of a Titanium Alloy. R. J. Kotfila and E. F. Erbin. *Metal Progress*, v. 66, Oct. 1954, p. 128-131.

Recent failures of titanium alloy components have been ascribed to hydrogen, and it is demonstrated here that this interstitial element lowers the tensile ductility of the 3% manganese complex alloy, the effect becoming most pronounced with decreasing strain rate at room temperature. Graphs. (Q23, Ti)

1076-Q. A Comparative Investigation on the Influence of Sheet Thickness, Type of Rivet and Number of Rivet Rows on the Fatigue Strength at Fluctuating Tension of Riveted Single Lap Joints of 24ST-Alclad Sheet and 17S Rivets. A. Hartman. *Netherlands Nationaal Luchtvaartlaboratorium Report* M.1943, Feb. 1954, 34 p.

NACA rivets were superior to snap and countersunk V-rivets at high loads. Thickness had no effect except at high loads with NACA rivets. Tables, graphs, diagrams. 1 ref. (Q7, K13, Al)

1077-Q. Static Tests and Fatigue Tests on Redux-Bonded Built-Up and Solid Light-Alloy Spar Booms. A. Hartman and J. H. Rondeel. *Netherlands Nationaal Luchtvaartlaboratorium Report* M.1936, Feb. 1954, 10 p. + 9 plates.

Bending fatigue of solid spar booms was superior, probably due to superiority of unclad material. Photographs, micrographs, tables, graphs, diagrams. 2 ref. (Q7, Al)

1078-Q. Buckling and Moment Table for Steel Beams. L. P. Hollingsworth. *Product Engineering*, v. 25, Oct. 1954, p. 211, 213, 215.

Table simplifies selection of most economical shape for a given application. Tables, diagram. (Q28, ST)

1079-Q. Temperature-Compensated Strain Gages. Alvin B. Kaufman. *Radio-Electronic Engineering*, v. 23, Nov. 1954, p. 20, 36.

New gages for measurements at high temperatures without compensating circuits. Circuits, graphs. 2 ref. (Q25)

1080-Q. An Experimental and Theoretical Investigation of the Anisotropy of 3S Aluminum-Alloy Sheet in the Plastic Range. Arthur J. McEvily, Jr., and Philip J. Hughes. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3248, Oct. 1954, 45 p.

Tension, compression and X-ray test data show anisotropy and preferred orientation. Theoretical analysis checked by data on copper. Tables, micrographs, drawings, photograph, graphs. 12 ref. (Q24, Al, Cu)

1081-Q. Some Observations on the Tertiary Stage of Creep of High-Purity Aluminium. G. R. Wilms. Commonwealth of Australia, Dept. of Supply, Defence Standards Laboratories Report 199, Jan. 1954, 13 p.

Structural changes are caused by deformation but do not influence creep rate. Intercrystalline fissures may be cause of increased strain rate. Graphs, micrographs, diffraction patterns. 11 ref. (Q3, Al)

1082-Q. (English.) The Torductor and the Pressductor, Two Magnetic Stress-Gauges of New Type. Orvar Dahle. *IVA Tidskrift for Teknisk-Vetenskaplig Forskning*, v. 25, no. 5, 1954, p. 221-238.

Illustrates uses for these rugged detectors which require no electronic amplification. Graphs, photographs, diagrams. 4 ref. (Q25)

1083-Q. (English.) Study of Cold-Working by Microfocussing X-Ray. I. Fine Structure of Laue Spot. Tomiya Sutoki and Koichi Nakajima. *Science Reports of the Research Institutes, Tohoku University*, ser. A, v. 6, no. 3, June 1954, p. 244-252.

With repeated old working and successive annealing at low temperatures the spot structure of aluminum single crystals remained lamellar but with high temperatures an irregular, complicated structure developed. Diagrams, photographs. 5 ref. (Q24, M26, Al)

1084-Q. (French.) A Study of the Annealing of Rolled Uranium. G. Cabane and J. Petit. *Revue de métallurgie*, v. 51, no. 9, Sept. 1954, p. 603-612; disc., p. 612-613.

Deformation proceeds by both twinning and slip causing differences in annealing behavior. Table, graphs, micrographs, diffraction patterns. 10 ref. (Q24, J23, U)

1085-Q. (German.) Research on the Effect of Heating on Cold Working and Internal Stresses. Karl Wellinger and Ernst Keil. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 20, no. 8, Aug. 1954, p. 264-268.

Long-time tensile and torsion tests on boiler steel in the as-delivered and the stretched state (20% elongation) at 350 to 500° C. Tables, diagrams, graphs. 1 ref. (Q25, CN)

1086-Q. (Russian.) Dynamic Stresses in a Mine Hoisting Cable. Lifting Load. G. N. Savin. *Doklady Akademii Nauk SSSR*, v. 97, no. 6, Aug. 21, 1954, p. 991-994.

Mathematical stress analysis. 4 ref. (Q25)

1087-Q. (Russian.) Onset of Flow During Torsion of Metallic Crystals. P. I. Kuleshov. *Doklady Akademii Nauk SSSR*, v. 97, no. 6, Aug. 21, 1954, p. 1015-1018.

Creep limit and slip equations of cubic and hexagonal crystals. Table, graphs. 2 ref. (Q1, Q24, Al, Cu)

1088-Q. (Russian.) Influence of Chromium on Bond Strength in Crystals of Alpha-Iron. V. K. Kritskaia, G. V. Kurdiumov and T. I. Stelletskaia. *Doklady Akademii Nauk SSSR*, v. 98, no. 1, Sept. 1, 1954, p. 63-66.

Influence of deformation, composition and heat treatment on molecular bonding. Tables, graphs. 4 ref. (Q23, Fe, Cr)

1089-Q. (Russian.) Effect of Surface Defects Upon Fatigue Strength of Crankshafts Made of Magnesium Cast Iron. I. V. Kudriavtsev and N. A. Balabanov. *Liteinoe Proizvodstvo*, 1954, no. 6, Sept., p. 18-20.

Endurance limits of pearlitic and ferritic magnesium cast irons and one steel compared for roll-burnished and unburnished crankshafts. Other mechanical properties. Diagrams, graph, tables, 6 ref. (Q7, CI)

1090-Q. Grain-Boundary Movement, Slip, and Fragmentation During Creep of Aluminium-Copper, Aluminium-Magnesium, and Aluminium-Zinc Alloys. D. McLean and M. H. Farmer. *Institute of Metals, Journal*, v. 83, Sept. 1954, p. 1-10 + 2 plates.

Tests show that slip and grain-boundary displacement occur concurrently. Magnitude of ratio depends on test conditions. Tables, graphs, micrographs, reflection patterns. 32 ref. (Q24, Q3, Al)

1091-Q. Fatigue Phenomena in High-Strength Aluminium Alloys. R. F. Hanstock. *Institute of Metals, Journal*, v. 83, Sept. 1954, p. 11-15 + 2 plates.

Influence of precipitation on fatigue strength. Diagram, graphs, photograph, micrographs, table. 1 ref. (Q7, N7, Al)

1092-Q. The Formation and Removal of Twins in Titanium During Deformation. A. T. Churchman. *Institute of Metals*, Journal, v. 83, Sept. 1954, p. 39-40 + 2 plates.

Twins in single crystals formed by bending can be removed by unbending or by annealing. Micrographs. 19 ref. (Q24, Ti)

1093-Q. New Super-High Strength Structural Steels. A. E. Nehrenberg. *Materials & Methods*, v. 40, Oct. 1954, p. 100-103.

Developed to improve strength-weight ratio of aircraft components and can be heat treated to strength levels of 200,000 to 300,000 psi. Graphs, tables, photograph. (Q23, J general, AY)

1094-Q. Relative Strengths and Densities of Some Engineering Materials. *Materials & Methods*, v. 40, Oct. 1954, p. 143.

Data sheet on mechanical and physical properties of some metals, plastics, wood and ceramic materials. (Q23, P10)

1095-Q. The Practical Appraisal of Stress Raisers in Design. *Mechanical World and Engineering Record*, v. 134, Oct. 1954, p. 462-464.

Elimination of stress raisers is a matter of design and production technique. Diagrams, table. (Q25)

1096-Q. Fatigue of Lead and Lead Alloys. J. McKeown. *Metal Industry*, v. 85, Oct. 8, 1954, p. 305-306.

Equipment and technique for accelerated testing. Relationship of dynamic strength and endurance limit. Photograph, graph, 1 ref. (Q7, Pb)

1097-Q. How Stresses Are Affected by Branch Connections. E. D. Abraham and G. M. McClure. *Pipe Line Industry*, v. 1, Sept. 1954, p. 60, 62-64.

Determination of maximum stresses, direction of principal stresses and over-all distortion of each connection under internal pressure in unreinforced branch connections and their effect on design of piping systems for gas transmission. Diagrams, photograph. (Q25)

1098-Q. Crack-Starter Tests of Ship Fracture and Project Steels. P. P. Puzak, M. E. Schuster and W. S. Pellini. *Welding Journal*, v. 33, Oct. 1954, p. 481S-495S.

Fracture propagation data for rimmed, semikilled and killed steels over range of service temperatures. Photographs, graphs, diagrams, tables. 17 ref. (Q26, CN)

1099-Q. Effects of Prestressing on Fatigue Strength of Spot-Welded Stainless Steels. Andre Choquet, V. N. Krivobok and Georges Welter. *Welding Journal,* v. 33, Oct. 1954, p. 509S-523S.

Hydrostatic compression gives greatest improvement. Significant gains are produced by simple compression, tension or hand peening. Graphs, diagrams, photographs, tables, micrographs. (Q7, K3, SS)

1100-Q. On the Formation of Hot Tears. V. G. Lyuttsau. *Henry Brutcher, Altadena, Calif., Translation no.* 3374, 7 p. (From *Liteinoe Proizvodstvo,* v. 5, no. 2, 1954, p. 16-18.)

Origin and development of hot tears and their relation to alloy composition. Significance of temperature and crystallization range on hot tear susceptibility. Tables, micrographs, diagrams, graphs. 2 ref. (Q26)

1101-Q. (English.) Buckling of Stressed Bars of Heterogeneous Materials. P. Csonka. *Acta Technica Academiae Scientiarum Hungaricae,* v. 9, nos. 3-4, 1954, p. 391-403.

Stress analysis studies of concentrically-loaded builtup members. Diagrams, graphs. 5 ref. (Q28, Q25)

1102-Q. (English.) The Effect of Various Fits on the Fatigue Strength of Pin-Hole Joints. A. Hartman and F. A. Jacobs. *Netherlands Nationaal Luchtvaartlaboratorium Report* M.-1946, Apr. 1954, 6 p. + 21 plates.

Pin-hole joints with a steel pin diameter of 10 or 6 mm. through 24ST Alclad sheet investigated for endurance from 10^4 to 5.10^7 load reversals. Tables, diagrams, graphs. 3 ref. (Q7, Al)

1103-Q. (English.) A Theory of the Formation of Slip Bands in Face-Centered Cubic Crystals. Hideji Suzuki. *Physical Society of Japan, Journal,* v. 9, no. 4, July-Aug. 1954, p. 531-540.

Three concepts used to explain multiplication of dislocations and differences between surface structures of abraded and unabraded crystals. Diagrams. 34 ref. (Q24)

1104-Q. (French.) Stress Analysis. Measuring Stresses by Resistance Strain Gages. R. Vessereau. *Chaleur & Industrie,* v. 35, no. 350, Sept. 1954, p. 241-255.

Description of gages, production problems, applications. Diagrams, photographs. (Q25)

1105-Q. (French.) Photo-Elastic Stress Analysis, Work of the Société Nationale des Etudes et des Constructions des Moteurs d'Aviation. R. Fleury and J. F. Zandman. *Docaero; revue documentaire de la technique aéronautique mondiale,* 1954, no. 29, p. 35-42.

Theoretical basis, procedure and applications. Photograph, charts. (Q25)

1106-Q. (French.) Generalized E. Dübi Hardness Characteristics. Albert Collaud. *Fonderie,* 1954, no. 104, Sept., p. 4119-4127.

Relationships of graphite content and Brinell hardness to other mechanical properties of gray cast iron. Photographs, drawings, charts, micrographs. 5 ref. (Q29, CI)

1107-Q. (German.) Residual Stresses in Built-Up Cylindrical Elements. Hans Bühler. *Schweissen und Schneiden,* v. 6, no. 9, Sept. 1954, p. 370-372.

Compositions and mechanical properties of investigated steels, determination of internal stresses by drilling and changes in length and diameter. Tables, graphs. 11 ref. (Q25, K general, CN)

1108-Q. (German.) The Gripping of Cylindrical Tensile-Test Specimens With Glass-Smooth Surfaces. H. Isken. *Sprechsaal,* v. 87, no. 19, Oct. 1954, p. 479-481.

Use of mixture to be cast into a cone jacket to hold smooth specimens. Diagrams, graph. (Q27)

1109-Q. (German.) Theory of Crystal Plasticity. I. Fundamentals of the Theory. Alfred Seeger. *Zeitschrift für Naturforschung,* v. 9a, no. 9, Sept. 1954, p. 758-775.

Outline of a theory deviating considerably from accepted concepts of critical shearing stress and creep. Practical tests for the new concepts. Graphs, diagrams, table. 97 ref. (Q23)

1110-Q. (Spanish.) Advances in the X-Ray Method for the Determination of Residual Stresses. A. Priegue Guerra. *Ciencia y técnica de la Soldadura,* v. 4, no. 19, July-Aug. 1954, 7 p.

Use of Geiger counter to measure X-ray diffraction of plastically deformed AISI 52100 steel. Photographs, diagrams, tables. (Q25, AY)

1111-Q. (Book.) SAE Transactions, (Annual Volume), v. 62, 1954, 656 p. Society of Automotive Engineers, Inc., 29 West 39th St., New York 18, N. Y.

Consists of 54 papers, five of which are individually abstracted. (Q general)

1112-Q. (Book.) The Steel Skeleton. J. F. Baker. v. **I. Elastic Behaviur and Design.** 206 p. 1954. Cambridge University Press, Bentley House, N.W.1., London, England. $8.50.

Stress analysis on experimental frameworks and on existing buildings. Behavior of various joints and beam constructions. (Q25, Q21, T25, ST)

1113-Q. (Book.) Strength and Resistance of Metals. John M. Lessells. 450 p. 1954. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $10.00.

Takes into account all the various stress conditions encountered in engineering applications such as static tension or compression, creep at elevated temperature, cyclically varying stresses as in fatigue, suddenly applied loads as in impact, and high surface stresses as in wear. (Q general)

1114-Q. (Book.) Theoretical Elasticity. A. E. Green and W. Zerna. 442 p. 1954. Oxford University Press, Amen House, London E.C.4, England; also 114 Fifth Ave., New York 11, N. Y. $6.75.

The general theory of finite elastic deformations; complex variable methods for two-dimensional problems for isotropic and aeolotropic bodies; and the shell theory. (Q21)

1115-Q. (Pamphlet.) Hot Hardness Testing of Chromium Base Alloys. H. T. Greenaway. Commonwealth of Australia, Dept. of Supply, Aeronautical Research Laboratories, Report SM. 195, June 1952, 11 p. + 9 plates.

Dynamic hot hardness tester for use up to 1000° C. Experimental data for chromium-tungsten, chromium-titanium and chromium-beryllium alloys. Diagram, graphs, micrographs. 7 ref. (Q29, Cr, W, Ti, Be)

Western Metal Congress and Exposition
Pan-Pacific Auditorium
Los Angeles
Mar. 28-April 1, 1955

R

Corrosion

459-R. Corrosion in Chemical Plant. T. K. Ross. *Chemical Age,* v. 71, Sept. 25, 1954, p. 655-659.

Attack by acid solutions, film growth. Electric potential of metal surfaces. (R6)

460-R. Control of Stress-Corrosion Cracking in Airframe Components. R. N. Hooker and J. L. Waisman. *Corrosion,* v. 10, Oct. 1954, p. 325-334.

Magnitude and orientation of stresses conducive to failures of structural members. Test data on effectiveness of various coatings in preventing cracking. Photographs, micrographs, graphs, diagrams. 2 ref. (R1, Al)

461-R. Electrical Measurements Applied to Corrosion Investigations. William R. Schneider and David Hendrickson. *Corrosion,* v. 10, Oct. 1954, p. 337-342.

Methods of locating anodic areas on wrapped or coated pipe lines. Diagrams, graphs, photographs. 8 ref. (R11, CN)

462-R. Radiometric Study of the Adsorption Characteristics of a Calcium Sulfonate Rust Inhibitor. Van Hong, Stanley L. Eisler, David Bootzin and Alex Harrison. *Corrosion,* v. 10, Oct. 1954, p. 343-348.

Radioactive calcium shows adsorption is effected by chemisorption rather than by simple physical forces. Tables, graphs. 16 ref. (R10, P13, ST)

463-R. Corrosion Prevention by Spray Packaging. D. W. Harbour. *Corrosion Prevention and Control,* v. 1, July 1954, p. 288-291, 295.

Materials and techniques for "sealed envelope" and "strippable film" packaging. Photographs. (R10, L26)

464-R. Fretting Corrosion. I-II. K. H. R. Wright. *Corrosion Prevention and Control,* v. 1, Sept. 1954, p. 405-410, 447; Oct. 1954, p. 465-471, 484.

Characteristics and mechanism, effects of humidity variations and preventive measures. Photographs, micrographs, graphs. (R1)

465-R. Corrosion of Pipes by Bacteria. L. T. Minchin. *Gas Age,* v. 114, Oct. 7, 1954, p. 45-47, 101-102.

European survey of microbiological anaerobic corrosion with special reference to experience in Low Countries. Table, photographs. 7 ref. (R1, CN)

466-R. CHC. Vapour-Phase Corrosion Inhibitor. *Machinery (London),* v. 85, Sept. 17, 1954, p. 630-634.

Nature, properties, action and use of cyclohexylamine carbonate, effect on metals and evaluation of vapor-phase corrosion inhibitors. Tables, photographs. (R10)

467-R. Corrosion Control by Anodic Protection. C. Edeleanu. *Metallurgia,* v. 50, no. 299, Sept. 1954, p. 113-116.

Although applicable only under special conditions, the process can give spectacular results such as protection of stainless steel in boiling sulfuric acid. Graphs, table, diagram, photograph. 4 ref. (R6, R10, SS)

468-R. The Oxidation of Iron at 175 to 350° C. D. E. Davies, U. R. Evans and J. N. Agar. *Royal Society, Proceedings,* v. 225, ser. A, Sept. 22, 1954, p. 443-462.

Oxidation of iron, previously freed from oxide by hydrogen treatment, was studied at 175 to 350° C. Five

methods (gravimetric, electrometric, film transfer followed by chemical or microscopic examination, X-rays and electron diffraction) used to identify and estimate oxides. Diagrams, tables, graphs. 65 ref. (R2, Fe)

469-R. Corrosion of Zirconium in High-Temperature Water. D. E. Thomas. Paper from "Nuclear Engineering". American Institute of Chemical Engineers, p. 16-22.

Kinetics of the corrosion reaction and the effects of impurities, surface preparation, mechanical deformation, metallurgical structure and water purity. Graphs, tables. (R4, Zr)

470-R. Corrosion of Metals. S. C. Britton. Paper from "Reports on the Progress of Applied Chemistry". Society of Chemical Industry, p. 232-242.

Surveys developments in Great Britain. High temperature, atmosperic, soil, water microbiological and stress corrosion. 134 ref. (R general)

471-R. (English.) The Influence of Anodic Oxide Films on the Thermal Oxidation of Zirconium. J. J. Polling and A. Charlesby. *Acta Metallurgica*, v. 2, no. 5, Sept. 1954, p. 667-674.

Electrolytic and thermal oxide layers have same effect on continued thermal oxidation. Relation of oxidation rate to temperature. Graphs, tables. 13 ref. (R2, Zr)

472-R. (German.) Damage to a Lead Cable Sheath by the Larvae of the Goat-Moth Caterpillar. Kurt Lapkamp and Ludwig Körner. *FTZ; Fernmeldetechnische Zeitschrift*, v. 7, no. 9, Sept. 1954, p. 465-467.

Biological habits, large and strong mandibles enable it to gnaw through lead plates. Photographs. (R1, Pb)

473-R. (German.) Passivation Phenomena on Nickel. Karl Hauffee and Irmtraud Pfeiffer. *Zeitschrift für Metallkunde*, v. 45, no. 9, Sept. 1954, p. 554-562.

Review of literature and experimental study of electrochemical behavior of thermally produced nickel oxide films, their passivation effects and effect of bromine ions on passivation. Diagrams, graphs. 41 ref. (R10, Ni)

474-R. Corrosive Conditions Encountered by Edge Cutlery. C. M. Kington. *Corrosion Technology*, v. 1, Sept. 1954, p. 226-228.

Typical cases of corrosion of knives, scissors and razors and means for their protection in shipping and storage. Photographs. (R general, CN, SS)

475-R. Cathodic Protection in the Marine Field. W. Godfrey Waite. *Corrosion Technology*, v. 1, Sept. 1954, p. 229-232.

Protection of hulls, propellers, stern gear, cargo compartments, floating docks and mooring buoys. Diagram. 5 ref. (R10, CN, CI, Cu, Al)

476-R. Corrosion and Deposit in Gas Turbines. B. O. Buckland. *Industrial and Engineering Chemistry*, v. 46, Oct. 1954, p. 2163-2166.

Methods developed for inhibiting the corrosive effects of sodium and vanadium in ash constituents and the problems involved in using residual fuels. Graphs, table, diagram. 3 ref. (R10, R7)

477-R. (German.) Evaluation of the Effectiveness of "Premium" Additives on the Basis of Laboratory-Corrosion Tests With Hot Automobile Oils. A. Bukowiecki. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 20, no. 8, Aug. 1954, p. 255-263.

Tests of regular and premium motor oils to determine their corrosive effects on lead, copper and iron as functions of accessibility of air, viscosity and type of additive. Photographs, micrographs, graphs. 19 ref. (R7, Pb, Cu, Fe)

478-R. (German.) Protection Against Corrosion by Means of Cast Magnesium Anodes. K. Sautner. *VDI Zeitschrift des Vereines deutscher Ingenieure*, v. 96, no. 28, Oct. 1, 1954, p. 951-954.

Explains protecting effect of magnesium on iron and shows it can be used successfully in marine equipment. Tables, diagrams, graph, photographs. 12 ref. (R10, Mg, St)

479-R. (Russian.) Determination of Two Basic Parameters of Long Subterranean Metallic Structures. B. G. Lortkipanidze. *Elektrichestvo*, 1954, no. 9, Sept., p. 64-65.

Equations for damping coefficient and effective resistance for calculating cathodic protection. Graphs. 3 ref. (R10, Q8)

480-R. Corrosion Control in Industrial and Steam Power Plants. Ralph M. Lemen. *Combustion*, v. 26, Oct. 1954, p. 38-44.

Entire range of possible corrosion problems with suggested solutions and analysis of applicability and limitations of preventive equipment. Diagrams, photographs, tables, graph, micrograph. (R general)

481-R. The Corrosion Section of the British Non-Ferrous Metals Research Association. P. T. Gilbert *Corrosion Technology*, v. 1, Oct. 1954, p. 276-279.

Facilities available and current work. Photographs. (R general, A9)

482-R. Electrical Techniques for Combating Underground Corrosion by Stray Electric Current. G. Mole. *Corrosion Technology*, v. 1, Oct. 1954, p. 280-285.

Review of techniques for location and control of underground corrosion. Diagrams, graphs. 17 ref. (R8, R10)

483-R. Corrosion Inhibitors. II. Inhibitors in Practice. L. L. Shreir. *Corrosion Technology*, v. 1, Oct. 1954, p. 291-294.

Factors influencing choice of inhibitor, characteristics of common inhibitors and water treatment. Photographs. 44 ref. (R10)

484-R. Protective Coatings—First Line of Defense Against Corrosion. Paul O. Blackmore. *Interchemical Review*, v.13, Autumn 1954, p. 75-84.

Corrosion theory and control. Photographs, diagrams, table. (R1, L general)

485-R. Motion Pictures as Corrosion Research Aid. F. H. Beck and M. G. Fontana. *Ohio State University. Engineering Experiment Station, News in Engineering*, v. 26, Nov. 1954, p. 3-7.

Equipment and procedures for recording stress-corrosion process on motion picture film. Diagrams, micrographs. 83 ref. (R1, R11, Mg)

486-R. How to Save Steel Tanks. Harry J. Keeling. *Pipe Line Industry*, v. 1, Sept. 1954, p. 68, 70, 73.

Corrosion virtually eliminated by insulating metal surface with application of protective coating to tank surface, or by applying cathodic protection current to surface of submerged metal. Photographs, diagram. (R10, ST)

487-R. The Protection of Aircraft Piston Engines Against Corrosion During Storage. D. Golothan. *Shell Aviation News*, 1954, no. 195, Sept., p. 19-22.

External and internal use of protective compounds. Laboratory testing of preservative oils. Photographs. (R10, L26)

488-R. (Dutch.) Corrosion-Resistant Materials. T. van der Klis. *Bedrijf en Techniek*, v. 9, no. 211, Sept. 25, 1954, p. 447, 449, 451, 453.

Classification of materials by resistance to specific corrosive agents, and temperature. (R general, SG-g)

489-R. (Dutch.) Corrosion Tests on Welded Austenitic Stainless Steel. A. Ph. Krijff and A. De Visser. *Smit Mededelingen*, v. 9, no. 3, July-Sept. 1954, p. 79-87.

Influence of plate material properties and plate thickness on test results. (R11, SS)

490-R. (French.) Influence of the Crystalline Orientation of Iron on the Formation of Oxide Nuclei at Its Surface at Low Oxygen Pressures and High Temperatures. Jean Bardolle and Jacques Benard. *Comptes rendus*, v. 239, no. 12, Sept. 20, 1954, p. 706-709.

Quantitative study on oxidation mechanism. Diagram, micrographs. 4 ref. (R2, Fe)

491-R. (French.) Corrosion of Castings and New Concept of Balanced pH (pHp). Albert Levasseur. *Fonderie*, 1954, no. 103, Aug., p. 4096-4098.

Modified concept relating acid-base concentrations and normal pH values. 8 ref. (R1)

492-R. (German.) Behavior of Different Sorts of Commercial Iron in Different Acids. Anton Königer. *Giesserei*, v. 41, no. 20, Sept. 30, 1954, p. 522-527.

Potentials of different cast irons and unalloyed steel in different concentrations of nitric acid show that gray iron can be passivated by up to 19.1% nitric acid concentrations. Diagrams, graphs. (R6, CI, CN)

493-R. (Norwegian.) Corrosion. B. S. Elset. *Teknisk Ukeblad*, v. 101, no. 35, Sept. 30, 1954, p. 765-767.

Various types of corrosion. Classification of metals and alloys on the basis of electrochemical potentials. (R general)

494-R. (Russian.) Influence of Some Inhibitors on the Rate of Solution of Carbon Steel in Nitric Acid. S. A. Balezin and G. S. Parfenov. *Zhurnal Prikladnoi Khimii*, v. 27, no. 9, Sept. 1954, p. 930-938.

Relates solution rate and iron electrode potential to acid concentration, temperature and mixing Diagram, tables, graphs. 27 ref. (R10, CN)

495-R. (Russian.) Corrosion of Iron in Fused-Salt Mixtures. V. P. Kochergin, A. V. Kabirov, and O. N. Skorniakova. *Zhurnal Prikladnoi Khimii*, v. 27, no. 9, Sept, 1954, p. 945-952.

Time and temperature relations in aqueous and dehydrated carnallites. Tables, graphs. 12 ref. (R5, R6)

496-R. (Russian.) Corrosion of Metals in Chlorine at Elevated Temperatures. Kh. L. Tseitlin. *Zhurnal Prikladnoi Khimii*, v. 27, no. 9, Sept. 1954, p. 953-958.

Apparatus used from 260 to 300° C. Table, graphs, diagrams. 9 ref. (R5, Al, CN, Cu, Ni)

S

Inspection and Control

383-S. Ultrasonic Testing. Edward F. Weller, Jr. *Aircraft Production*, v. 16, Oct. 1954, p. 422-425.

Resonance, transmission and frequency modulation methods. Equipment; applications. Photographs, diagram, circuit. (S13, S14, S15)

384-S. Probolog—An Application of Eddy Current Techniques to Non-Destructive Testing. William J. Warren. *Corrosion*, v. 10, Oct. 1954, p. 318-323; disc., p. 323.

Principles of eddy current phe-

nomena and their application. Diagrams, graphs, photograph. (S13)

385-S. A Reflectometer for the Assessment of Surface Texture. J. Halling. *Journal of Scientific Instruments*, v. 31, Sept. 1954, p. 318-320.

Simple optical-mechanical instrument which gives a rapid assessment of the surface texture of machined surfaces. Photographs, diagram, graph. 6 ref. (S15)

386-S. Non-Destructive Testing. C. M. Gilmour. *Metal Industry*, v. 85, Sept. 17, 1954, p. 229.

Sigma-test instrument based on electrical measurements. Can be used for electrical conductivity, detection of contamination, adjustment of furnace charges, sorting of metals, degrees of age hardening, surface cracks. (S10, S11, S13, P15)

387-S. How to Assure Quality Production Through Tool and Gage Control. Thomas J. Bizzoco. *Modern Machine Shop*, v. 27, Oct. 1954, p. 160 + 7 pages.

A virtually foolproof system for tool, instrument and gage control, featuring economy and practicability of operation. Tables, diagram. (S14)

388-S. A Copper Resistance Temperature Scale. T. M. Dauphinee and H. Preston-Thomas. *Review of Scientific Instruments*, v. 25, Sept. 1954, p. 884-886.

Excellent thermal contact achieved by fine commercial copper wire, attached with Formel varnish to a copper base, which has sufficiently stable and reproducible resistance temperature characteristics to be used as a resistance thermometer in the temperature range 20-320° K. Graphs, table. 4 ref. (S16, Cu)

389-S. Magnetic Comparator Testing of Steel Cartridge Cases. S. S. Rice. *Tooling and Production*, v. 20, Oct. 1954, p. 83 + 5 pages.

Profitable application of nondestructive testing for quality control. Use for sorting on basis of various properties detectable by magnetic changes. Photographs, graphs. (S10)

390-S. Ultrasonic Transparency of Steel and Its Bearing on the Results Obtained With the Pulse-Reflection Technique. A. Michalski. *Henry Brutcher, Altadena, Calif., Translation no.* 3308, 15 p. (Abridged from *Stahl und Eisen*, v. 74, no. 1, 1954, p. 26-33.)

Previously abstracted from original. See item 113-S, 1954. (S13)

391-S. (Dutch.) Copper and Copper Alloys. XIV. Special Brass. G. R. de Jager. *Metalen*, v. 9, no. 17, Sept. 15, 1954, p. 272-276.

Table of standardized alloys in Germany, England, and the United States gives compositions and mechanical properties. (S22, Cu)

392-S. (German.) Measuring Temperature in Industry. H. Frisch. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben*, v. 99, nos. 8-9, Aug.-Sept. 1954, p. 172-176.

Vapor-pressure, liquid-expansion, resistance, thermoelectrical and radiation thermometers described. Diagrams, photograph. 5 ref. (S16)

393-S. (German.) Microcondition of Surface. Status of Measuring Technique. J. Perthen. *VDI Zeitschrift des Vereines deutscher Ingenieure*, v. 96, no. 25, Sept. 1, 1954, p. 855-863.

Types of viewers, scanners, interference microscopes and electrical and electronic recorders for studying surface conditions. Graphs, photographs, diagrams. 19 ref. (S15)

394-S. Measurement of Plating Thickness. G. Howells. *Corrosion Technology*, v. 1, Sept. 1954, p. 233-236.

Review of chemical, magnetic, X-ray and eddy-current methods. Graphs, diagrams. (S14. L general)

395-S. Common Sense Nondestructive Testing. R. C. McMaster. *Nondestructive Testing*, v. 12, Sept.-Oct. 1954, p. 13-17.

Normal use of human senses illustrate basic principles of nondestructive testing. Drawings. (S general)

396-S. Tools of Inspection. Rebecca H. Sparling. *Nondestructive Testing*, v. 12, Sept.-Oct. 1954, p. 19-28.

Nondestructive tests for indicating quality or soundness of metals. Diagrams. (S13)

397-S. The Theory of Eddy Current Testing in One (Not-So-Easy) Lesson. Richard Hochschild. *Nondestructive Testing*, v. 12, Sept.-Oct. 1954, p. 31-40.

Theory and applications. Diagram, graphs. (S13)

398-S. (Russian.) Application of Oscillographic Polarography for Quantitative Determination of Titanium. Ia. P. Gokhshtein, S. I. Siniakova and V. D. Iukhtanova. *Zhurnal Analiticheskoi Khimii*, v. 9, no. 5, Sept.-Oct. 1954, p. 255-264 + 2 plates.

Effect of rate of variation of potential on magnitude of maximum current for reduction of titanium. Effect of molybdenum, chromium and nickel. Tables, oscillographs, graphs. (S11, Ti, Fe, Mo, Cr, Ni)

399-S. Design Specifications for Stainless Steel, Type 301. E. W. Hammer and R. E. Petersen. *American Iron and Steel Institute, Preprint*, 1954, 22 p.

Tentative specifications for various applications. Data for design of columns. Diagrams, graphs. (S22, T general, SS)

400-S. New Thickness Gages for Metallic Coatings. *Metal Finishing*, v. 52, Oct. 1954, p. 52-55.

Three nondestructive instruments developed by National Bureau of Standards. Photographs. 7 ref. (S14, L general)

401-S. New Concepts in Spot X-Ray of Welded Structures. Harold Hovland. *Welding Journal*, v. 33, Oct. 1954, p. 962-965.

Portable X-ray equipment to replace trepanning inspection of welds. Photographs. (S13, K9, CN)

402-S. Electronic 'Private Eyes' Guard Against Structural Flaws in Jet Components. A. S. Billings. *Western Metals*, v. 12, Oct. 1954, p. 63-65.

Applications of X-ray metallography, fluorescent and die penetrants, magnetic particle inspection, spectroscopy. Photographs. (S13)

403-S. Ultrasonic Testing of Intricately Shaped Parts. E. Martin and K. Werner. *Henry Brutcher, Altadena, Calif., Translation no.* 3291, 20 p. (From *Archiv für das Eisenhüttenwesen*, v. 24, nos. 9-10, 1953, p. 411-422.)

Relationship between path of ultrasonic waves and location and size of defects by the pulse reflection method using oblique incidence of beam. Photographs, diagrams, reflectograms. 1 ref. (S13)

404-S. (Russian.) Use of Radioactive Isotopes in Industry. M. B. Neiman. *Priroda*, v. 43, no. 10, Oct. 1954, p. 16-27.

Applications in metallurgy, nondestructive testing, chemical and petroleum industries and communication. Table, diagrams, photographs, graphs. (S19)

405-S. (Book.) Handbook on Radiography. 71 p. 1950. Atomic Energy of Canada, Ltd., Commercial Products Division, P.O. Box 93, Ottawa, Canada. $2.00.

Sources of radiation; fundamentals, equipment, and applications of radiography. (S13)

406-S. (Book.) Standards in a Changing World. Fourth National Standardization Conference, Proceedings. 74 p. 1953. American Standards Association Inc., 70 East 45th St., New York 17, N. Y. $3.00.

Advantages, examples, and applications of standards for manufacturing, design, procurement, and inventory control. (S22)

T

Applications of Metals in Equipment

296-T. Steels for Mines. *Edgar Allen News*, v. 33, Sept. 1954, p. 193-195.

Principal qualities of mining drill steels and uses, heat treatment, tungsten carbide tipped drilling equipment. Tables, photographs. (To be concluded.) (T28, T6, TS)

297-T. Manganese Steel for the Lumber Industry. *Edgar Allen News*, v. 33, Sept. 1954, p. 196-197.

Tough, strong, wear-hard qualities favorable for lumber industry equipment. Photographs, table. (To be continued.) (T29, AY)

298-T. High-Coercive-Force Permanent-Magnet Materials and Their Application. T. O. Paine and L. I. Mendelsohn. *Electrical Engineering*, v. 73, Oct. 1954, p. 891-895.

Includes graphs, table, diagrams. 18 ref. (T general, P16, SG-n)

299-T. Signal Corps-Developed General-Purpose Multicontact Connectors. Milton Tenzer. *Electrical Manufacturing*, v. 54, Oct. 1954, p. 85-89.

Knife-blade type with low insertion force is self-sealing and cleaning. It is made of cadmium-plated cast aluminum and is watertight both in mated and unmated positions. Photographs, diagrams, tables. (T1, Al, Cd)

300-T. Four Factors Determine Selection of Leaded Steels. F. J. Robbins. *Iron Age*, v. 174, Oct. 7, 1954, p. 117-120.

Advantages and possible applications. Photographs. 6 ref. (T general, AY)

301-T. Developments in Nimonic Alloys. *Metal Industry*, v. 85, Sept. 17, 1954, p. 232.

Applications of extruded sections in gas turbines. Photographs, graph, diagram. (T25, Ni)

302-T. Materials for Gas Turbines. H. Sutton. *Metallurgia*, v. 50, no. 299, Sept. 1954, p. 131-134.

Mechanical properties of various materials and how they meet requirements. Tables. (T25, Q general)

303-T. Special Ceramics for Engineering Uses. T. G. Carruthers and A. L. Roberts. *Research*, v. 7, Oct. 1954, p. 379-383.

Possible use of sintered oxides—particularly alumina—as cutting tool materials. Table, photograph. 7 ref. (T6, SG-j)

304-T. The Metallurgy of Hot-Formed Springs. W. O. Beale and C. G. Lowth. *Australasian Engineer*, 1954, Aug., p. 54-58; disc., p. 58-61.

Springs manufactured from hot-rolled bar stock and the merits of the various grades of steel. Metallurgical aspects of steelmaking, rolling, spring manufacture and finished springs in relation to their service requirements. Graphs, diagrams, table. 4 ref. (T7, ST)

305-T. Aluminum Foil in Transformer Coils. Albert Zack. *Modern Metals*, v. 10, Oct. 1954, p. 35-37.

Use of foil eliminates need for fine wire in wafer coils and simplifies winding operation. Photographs, diagrams, graph. (T1, Al)

306-T. Aluminum in the Fishing Industry. *Modern Metals,* v. 10, Oct. 1954, p. 42 + 4 pages.

Applications on boats and all types of fish-handling equipment. Photographs, diagrams. (T22, Al)

307-T. Saving Machining Costs With Aluminum Castings. W. J. Evans. *Modern Metals,* v. 10, Oct. 1954, p. 68-69.

Advantages of aluminum over cast iron. (T general, G17, Al, CI)

308-T. Titanium in Air-Borne and Lightweight Army Equipment. T. E. Perry. *Modern Metals,* v. 10, Oct. 1954, p. 75-76, 78-79.

Fabrication and design solutions developed by Army and contractors. Photographs. (T2, G general, Ti)

309-T. Increasing Civilian Applications for Aluminum. G. Perkins. *Light Metal Age,* v. 12, Oct. 1954, p. 16-17.

Sheet, foil and castings in various applications. Photograph. (T general, Al)

310-T. How Many Pounds of Zinc Die Castings Go Into Today's Cars? *Precision Metal Molding,* v. 12, Nov. 1954, p. 39-41.

Consumption data and typical applications. Graph, photographs. (T21, Zn)

311-T. Materials Development for the Submarine Thermal Reactor. William A. Johnson. *Westinghouse Engineer,* v. 14, Nov. 1954, p. 208-212.

Use of zirconium, corrosion, wear of materials and coolant development. Photographs, diagram. (T25)

312-T. (French.) **Cast and Welded Construction Combined in Cockerill-Baldwin Diesel-Electric Locomotives for Otraco.** M. Alexandre and P. Laval. *Ossature métallique,* v. 19, no. 10, Oct. 1954, p. 485-490.

Construction of trucks and frame. Photographs, diagrams. (T23, E general, K general, ST)

313-T. (French.) **Sets of Extruded Bars in First and Second Class Installations.** René Rols. *Revue de l'Aluminium,* v. 31, no 212, July-Aug. 1954, p. 225-230.

Economics and range of application of U-shaped extruded aluminum bus bars; electrical and mechanical design; special techniques of installation. Diagrams, tables, graphs. (To be continued.) (T1, Al)

314-T. (French.) **Nickel in the Manufacture of Oxide Cathodes.** Jean Chalansonnet. *Vide,* v. 9, no. 51 May, 1954, p. 22-27.

Survey of French and European work on use of nickel alloys in electron tubes. Tables, diagrams. (T1, Ni)

315-T. (German.) **Handling and Treating Hard Metal Tools for Percussion and Rotary Drills and Drill Rods.** Otto Müller. *Glückauf,* v. 90, nos. 37-38, Sept. 11, 1954, p. 1074-1085.

Uses of different type drills, methods of attaching drills to drill rods, rod fractures. Heat treatment of hollow drills, forging of drill rods. Tables, diagrams, photographs. 30 ref. (T7, F22, J general, TS)

316-T. (Book.) **Constructional Steelwork Simply Explained.** Oscar Faber. 3rd Ed. 136 p. 1954. Oxford University Press, Amen House, London E.C.4, England; also 114 Fifth Ave., New York 11, N. Y. $2.00.

Revised values and calculating methods for permissible stresses based on new British Standard Regulations. (T26, Q25, ST)

317-T. (Book.) **Symposium on Aluminium in Building.** 130 p. 1954. Aluminium Development Association, 33 Grosvenor St., London, W.1. 4s.

Includes "An Architect's Appraisal of Aluminium in Building", Robert H. Matthew; "Aluminium and Craftsmen in Building", G. H. Friese-Greene; and "Aluminium for Roofing and Cladding", E. G. West. (T26, Al)

V

Materials

General Coverage of Specific Materials

345-V. Titanium in Canada. Laura Tatham. *Canadian Business,* v. 27, Oct. 1954, p. 26-29.

Refining problems, properties and applications. Photograph. (Ti)

346-V. An Appraisal of Cold-Reduced Electrical Steels. D. W. Thompson and G. R. Hemmeter. *Electrical Manufacturing,* v. 54, Oct. 1954, p. 80-84.

Comparison of cold rolled versus hot rolled sheets. Fabrication, properties, structure, performance characteristics. Micrographs, graphs, photograph. (SG-p, ST)

347-V. Electrical Contacts. II. F. J. Spayth and V. E. Heil. *Electrical Manufacturing,* v. 54, Oct. 1954, p. 122-127, 340.

Performance factors on pure metals, true alloys, silver semi-refractory compacts and compositions of refractory metals with silver or copper. Properties and applications. Tables, photographs. (T1, SG-r)

348-V. Lower-Nickel Stainless Steel Castings. J. Lomas. *Machinery Lloyd (Overseas Ed.),* v. 26, Sept. 25, 1954, p. 83, 85.

Properties and application of 21% chromium, 9% nickel alloys. (SS)

349-V. Good Commercial Nodular Irons Rival Steel in Strength, Ductility. Richard Schneidewind. *SAE Journal,* v. 62, Oct. 1954, p. 94-96.

Attractive properties for automotive and tractor parts. Castability superior to steel and malleable iron. Table, graph. (T21, T3, E general, CI)

350-V. Tool Steels for Plastic Molds. Hugo G. Becker. *SPE Journal,* v. 10, Oct. 1954, p. 19-27, 43.

Advantages, costs, production, applications. Tables, graphs, micrographs, photographs. (T29, TS)

351-V. Non-Ferrous Metals: Physical Metallurgy. T. Ll. Richards, G. K. Williamson and D. E. Yeomans. Paper from "Reports on the Progress of Applied Chemistry". Society of Chemical Industry, p. 208-221.

Progress in British studies of mechanical properties, recovery and recrystallization and constitution and structure of alloys. 184 ref. (EG-a)

352-V. (German.) **The Plain Carbon Toolsteels.** Franz Rapatz and Otto Mirt. *Stahl und Eisen,* v. 74, no. 19, Sept. 9, 1954, p. 1195-1202.

Compares compositions and properties of steels used in various countries. Effects of silicon and aluminum on hardenability and quench cracking. Tables, micrographs, graphs, photographs. 25 ref. (J26, TS)

353-V. (German.) **New Copper Alloys, Especially for the Production of Cast Parts.** Eugen Vaders. *Zeitschrift für Metallkunde,* v. 45, no. 9, Sept. 1954, p. 528-533.

Copper-arsenic, copper-antimony and copper-lead-silicon alloys with strength, bearing and wear-resistance properties superior to those of copper-tin bronzes. Suitability of new alloys for chill castings with smooth, oxide-free surfaces. Tables, micrographs, photographs. 7 ref. (Cu, Pb, Sn)

354-V. Some 12 Per Cent Chromium Alloys for 1000° F. to 1200° F. Operation. D. L. Newhouse, B. R. Seguin and E. M. Lape. *ASME, Transactions,* v. 76, Oct. 1954, p. 1107-1120; disc., p. 1120-1122.

Composition, heat treatment, tempering effects, stress-corrosion, nitriding and welding. Tables, graphs, micrograph. 9 ref. (SS, SG-h)

355-V. Aluminum Alloys. Harry W. Fritts. *Industrial and Engineering Chemistry,* v. 46, Oct. 1954, p. 2045-2052.

Development of existing applications and new products for the process and other industries. Photograph. 135 ref. (T29, Al)

356-V. Copper and Copper Alloys. Raphael Katzen. *Industrial and Engineering Chemistry,* v. 46, Oct. 1954, p. 2065-2066.

Significant developments and data accumulated during past 3 yr. Photograph. 11 ref. (T29, Cu)

357-V. Iron, Mild Steels, and Low-Alloy Steels. Homer L. Shaw. *Industrial and Engineering Chemistry,* v. 46, Oct. 1954, p. 2084-2087.

Developments in iron, and mild and low alloy steels during 1953 of interest to the chemical industry. 64 ref. (T29, CI, CN, AY)

358-V. Lead and Lead Alloys. Kempton H. Roll. *Industrial and Engineering Chemistry,* v. 46, Oct. 1954, p. 2088-2091.

Research progress, engineering applications and technological advancements during past year. 35 ref. (T29, Pb)

359-V. Nickel and High-Nickel Alloys. H. O. Teeple. *Industrial and Engineering Chemistry,* v. 46, Oct. 1954, p. 2092-2107.

Physical and mechanical properties, corrosion-resisting characteristics and significance in industrial problems. 200 ref. (T29, Ni)

360-V. Stainless Steels and Other Ferrous Alloys. Walter A. Luce. *Industrial and Engineering Chemistry,* v. 46, Oct. 1954, p. 2114-2124.

Corrosion, mechanical properties and structure, high-temperature properties, welding, metal working

(Continued on p. 51)

EMPLOYMENT SERVICE BUREAU

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ENGINEER: To supervise installation of Ajax Salt Bath Furnaces and work handling mechanisms. Position permanent, vacation, pension plan. Send photo and all details in first letter. Confidential. Ajax Electric Co., Philadelphia, 23, Pa.

WELDING DEVELOPMENT ENGINEER: Degree in metallurgical or welding engineering and two years experience required. To supervise welding development research projects, investigate shop problems resulting from new welding procedures, prepare research reports. Age 25 to 35, salary $400 to $825 per month, depending on experience. Location Dunkirk, N. Y. Write: G. Y. Taylor, Director, Pensonnel Dept., American Locomotive Co., Schenectady, N. Y. re position D-55.

METALLURGICAL ENGINEER: Graduate with academic or shop experience in welding, material testing, shop methods. Limited travel involved. Desire man who can eventually represent company with customers and vendors. Age 22 to 30, salary $350 to $450. Write: G. Y. Taylor, Director, Personnel Dept., American Locomotive Co., Schenectady, N. Y. re position S-54.

MECHANICAL ENGINEER: For engineering duties connected with field explosion tests of full-sized and scale model submarines. Address inquiries to: Code 1817, Naval Research Laboratory, Washington 25, D. C.

SALES ENGINEER: Mechanical or metallurgical degree preferred. Under 35 years. Basic training in sales development leading to field assignment promoting a new revolutionary metallurgical process for coating metals. Large organization. State previous experience, salary expected, include picture. Box 12-125.

Midwest

METALLURIGAL/CHEMICAL ENGINEER: Graduate wanted to assist melting department metallurgist in steel mill making high speed, tool, stainless, specialty steels and high-temperature alloys. In reply give details of education, experience, age, references, etc. Box 12-5.

METALLURGIST: Graduate with several years experience for process development in steel mill making high-temperature alloys, high speed, tool, stainless and specialty steels. Duties would involve development of processing procedures for new alloys as well as improvement of processes for established alloys under direction of process development metallurgist. Write details of education, experience, age, reference, etc. Box 12-10.

METALLURGIST: For laboratory work in steel mill making high-temperature alloys, high speed, tool, stainless and specialty steels. Work will include metallurgical examination of materials, writing reports, conducting investigations of mill problems involving large variety of alloys. Good opportunity for graduate with one to three years experience. In reply state education, experience, age, references, etc. Box 12-15.

PHYSICAL METALLURGISTS: With one to four years experience in high-temperature alloys, light alloys, mechanical testing, welding and brazing development and application. Write: Bruce D. Wood, Technical Personnel, Westinghouse Electric Corp., Aviation Gas Turbine. P. O. Box 228, Kansas City, Mo.

FERROUS METALLURGIST: U. S. citizen with B.S. in metallurgical engineering and minimum of two years of steel mill experience. Technologist position in research and development department of large midwestern steel mill. Both laboratory and production type experimentation to improve properties of and manufacturing practices for wide variety of plain carbon, alloy and stainless steels and cast irons. Opportunities for promotion. Please reply stating age, education, experience and salary requirements. Box 12-20.

THEORETICAL METALLURGIST: Recent Ph.D. in metallurgy, to work as member of group doing basic research on properties and uses of refractory metals. Graduate specilization or equivalent experience in theoretical metallurgy essential. Major assignment will be in fundamental problems in a field of metallurgy that is growing in importance to basic industries. Suburban Chicago area. Submit details in first letter, all replies confidential. Address: Fansteel Metallurgical Corp., North Chicago, Ill.

ASSISTANT METALLURGICAL ENGINEER: Recent graduate or 1 to 3 years experience for metallography, incoming steel inspection, control of shop procedures and production control of various products. Excellent opportunity for advancement on research and development projects. Salary commensurate with experience. All replies confidential. Send resume of training and experience. Box 12-25.

FOUNDRY SUPERINTENDENT: Large manufacturer seeking top foundry man with precision casting experience for position of responsibility. Need not possess degree but should have sound experience in this field. Very attractive opportunity with excellent growth potential. Box 12-155.

RESEARCH METALLURGISTS: Young metallurgical or welding engineers with practical welding experience. Must have M.S. or B.S. degree for position with dynamic automotive research organization. Box 12-160.

West

VICE-PRESIDENT OF SALES: For national manufacturer of forgings, castings, and pipe fittings. Desire man under 45 with college degree in engineering and a successfull record of sales to heavy industry. Should be familiar with manufacturing problems of foundries and forge plants. Must be strong administrator, profit conscious, familiar with market research sales techniques as well as production problems. This is senior sales position with firm recognized for outstanding quality of its products. Salary will be in $25,000 range with excellent future for qualified candidate. An executive incentive plan will be added. Box 12-30.

METALLURGISTS: Outstanding governmental metallurgical research and development laboratory in Western Oregon has openings for both recent graduates and project leaders. Excellent opportunity for recognition, development and publication in fields of unusual or high-purity metals. Forward Application for Federal Employment, Form 57, to Box 12-35.

METALLURGIST: Experienced light metals metallurgist to operate aluminum melting and billet casting departments in Texas extrusion plant. Send complete resume. All replies confidential. Box 12-120.

POSITIONS WANTED

METALLURGICAL ENGINEER: M.S. degree in metallurgical engineering. Registered professional engineer. Applied experience in most phases of metallurgy, foundry, steel production, heat treatment of automotive, aircraft parts. Currently in production work in Canada, British subject. Desires firm to sponsor immigration for permanent position in U. S. Box 12-40.

MANAGEMENT POSITION: Responsibility sought by Ph.D. under 40 with broad technical and administrative experiences A.E.C and refractory metals, reduction processes, semiconductors, magnet materials, etc. Creative productive, many patents and publications. Competent administrator. Interested in any position which is challenging and financially rewarding, or potentially so. Box 12-45

METALLURGICAL ENGINEER: Age 34, seven years responsible experience in development, customer service and technical supervision with specialty steel and aircraft engine manufacturers. Desires association with small manufacturer or fabricator in technical sales or supervision. Box 12-50.

INDUSTRIAL ENGINEER: Fifteen years diversified experience including nonferrous metallurgy and chemistry. Expert on aluminum dip brazing. Wide experience in silver

brazing, substantial background in procurement, specifications and customer relations. Three years experience with silicone rubber molding and adhesion problems. Will consider challenging position. Resume upon request. Box 12-55.

METALLURGICAL ENGINEER: B.S. degree, age 25, married, one child. Will complete three year tour of active duty as naval officer in March. Considerable supervisory experience both military and civilian personnel. Five months experience in research and development laboratory in large sheet and tin mill as undergraduate. Desires position in production or industrial engineering. Prefers Midwest or East. Box 12-60.

METALLURGICAL ENGINEER: B.S. degree, age 32, family. Nine years diversified experience in heat treating, material specifications, metal finishing. Desires responsible position with progressive West Coast firm or branch office. Will consider technical sales and service work. Box 12-65.

FOUNDRY ENGINEER: Eight years experience, including five years as design engineer for high-speed, automatic equipment and two and one-half years as plant engineer in steel foundry and one year as manager of a field operation. Other experience includes qualified toolmaking background, five years in supervisory capacities in production machine shops. Age 41. Box 12-70.

METALLURGICAL ENGINEER: With 3½ years big company experience, 1½ years as supervisor, in research and development. M.S. degree in metallurgy, wide interest, mechanical adeptness. Desires position in small or medium size company located in western two-third's U. S., cool climate preferred. Expect responsible position, with opportunity to exercise capabilities. Veteran, 30, married children. Box 12-75.

METALLURGICAL PROCESS ENGINEER-ADMINISTRATIVE: M.S. in electrochemistry Eng.D. metallurgy, age 48, versatile, practical, 25 years experience in large steel mills, electronics, aircraft, industrial furnaces. Lecturer, author, languages. Seeks position of responsibility with established organization. Box 12-80.

TECHNICAL and SALES REPRESENTATIVE: Over 20 years successful experience in metallurgical and technical field doing business in New York Metropolitan and Eastern States area. Desires contracts with companies interested in developing sales and products in this section. Correspondence invited and details furnished to interested firms. Box 12-85.

METALLURGICAL ENGINEER: B.S. degree in metallurgical engineering, married, age 22, recent graduate. Experience in welding and metallurgical engineering and physical testing. Desires more creative and responsible position in metals industry as junior engineer doing development or research work. Willing to start from bottom and advance in position. Any location in U. S. Box 12-90.

METALLURGICAL ENGINEER: Desires responsibility for solution of metallurgical or allied problems in company producing for civilian economy. Age 39, 18 years experience with people and equipment in research and development. Has solved problems in vacuum metallurgy, powder metallurgy, heat treatment, welding, laboratory installation, application of electrical equipment for induction heating and welding and measurement. M.S. degree. Box 12-95.

METALLURGICAL ADMINISTRATOR. Thoroughly experienced and versatile, desires connection with company planning establishment of laboratory and metallurgical department or expansion of present facilities. Exceptionally oustanding 15-year record of accomplishment in this field available for your consideration. Age 39, married, 2 children. Minimum salary $12,000. Box 12-100.

METALLURGIST: Practical 15 years industrial experience in supervisory position. Chemical and physical testing, superision of heat treating, development of flame and induction hardening, magnaflux and zyglo inspection, various types of plating, phosphate and oxide block coating. Experience also includes planning, purchasing equipment, supervising complete heat treat department layouts, installation, setting up procedures, training personnel. Desires responsible supervisory position. Box 12-105.

RESEARCH METALLURGIST: B.A., M.S. degrees in physical chemistry, physical metallurgy, Phi Beta Kappa. Four years experience in fundamental and applied research in A.E.C. laboratory and large steel corporation. Vacuum, X-ray, metallography, mechanical testing, heat treatment, arc melting, vacuum melting, precipitation hardening, phase diagram, technical report writing. Desires responsible position in eastern N. Y. or New England. Box 12-110.

METALLURGICAL ENGINEER: B.S. degree, age 24, single. On active duty as navy project officer at Naval gun factory. Eighteen months experience in X-ray and test procedures. Familiar with administration, production, welding and heat treating. Desires production, research position. Prefers Midwest. Available June 1955. Box 12-115.

(Continued from p. 48)

and surface treatment. Photographs. 167 ref. (T29, SS)

361-V. Tin and Its Alloys. Robert J. Nekervis. *Industrial and Engineering Chemistry,* v. 46, Oct. 1954, p. 2124-2127.

Tin as a replacement for nickel in electrocoating and copper alloys, new tin-containing materials, coating methods and corrosion resistance. Photographs. 56 ref. (T29, L17, Sn)

362-V. Less Common Metals. W. R. Bekebrede and L. F. Yntema. *Industrial and Engineering Chemistry,* v. 46, Oct. 1954, p. 2130-2135.

Literature review of 1954 on titanium, molybdenum, zirconium and tantalum as materials of construction. Photograph. 35 ref. (T29, Ti, Mo, Zr, Ta)

363-V. High-Strength Weldable Steel. W. E. Bardgett and L. Reeve. *Iron & Steel,* v. 27, Oct. 1954, p. 479-485.

Development of Fortiweld (low-alloy, boron-molybdenum) steel from 1949 to 1953. Effects of composition and heat treatment on mechanical properties. Tables, graphs. (Q general, K general, AY)

364-V. (German.) **Extruded Products of Alloy ZnAl32Cu3.** J. Schramm. *Metall,* v. 8, nos. 19-20, Oct. 1954, p. 773-778.

Compositions, structures, mechanical properties and uses. Graphs, tables. 9 ref. (Zn, Al, Cu)

365-V. NI-Hard. Hard White Cast Iron. *Alloy Digest,* no. Cl-9, Nov. 1954.

Composition, physical and mechanical properties and processing data. (Cl)

366-V. Berylco 165. Heat Treatable Beryllium Copper Wrought Alloy. *Alloy Digest,* no. Cu-20, Nov. 1954.

Composition, physical and mechanical properties and processing data. (Cu)

367-V. Chlorimet No. 2. Corrosion Resistant Alloy. *Alloy Digest,* no. Ni-12, Nov. 1954.

Composition, mechanical properties, corrosion resistance and processing data. (SG-g, Ni, Mo)

368-V. Fortiweld. High Tensile, Weldable Steel. *Alloy Digest,* no. SA-22, Nov. 1954.

Composition, physical and mechanical properties and processing data. (AY)

369-V. AISI 4130. Chromium-Molybdenum Alloy Steel. *Alloy Digest,* no. SA-4130, Nov. 1954.

Composition, physical and mechanical properties and processing data. (AY)

370-V. Copper Alloy V2B. Precipitation-Hardening Stainless Steel. *Alloy Digest,* no. SS-20, Nov. 1954.

Composition, mechanical properties, processing and corrosion resistance. (SS)

371-V. Electrite Ultra Cobalt. High Speed Steel. *Alloy Digest,* no. TS-27, Nov. 1954.

Composition, mechanical properties, heat treating and machinability. (TS)

372-V. Mallory 1000. High Density Tungsten Alloy. *Alloy Digest,* no. W-2, Nov. 1954.

Composition, physical and mechanical properties, corrosion resistance, machinability and joining. (W)

373-V. Steel Quality. Charles M. Parker. *American Iron and Steel Institute, Preprint,* 1954, 13 p.

Factors involved for various grades of steel. (ST)

374-V. Tantalum. A. F. G. Cadenhead. *Canadian Metals,* v. 17, Oct. 1954, p. 24.

Sources, chemical, physical and mechanical properties, uses. (Ta)

375-V. Chromium and Chromium-Rich Alloys. A. H. Sully. *Birmingham Metallurgical Society, Journal,* v. 34, Sept. 1954, p. 112-127.

Production, physical, chemical and mechanical properties. Micrographs, graphs, diagram, photograph. (Cr)

376-V. Lead and Lead Alloys. *Materials & Methods,* v. 40, Oct. 1954, p. 139, 141.

Data sheets of physical and mechanical properties. (Pb)

377-V. Which Beryllium Copper Alloy for Your Casting? J. T. Richards. *Precision Metal Molding,* v. 12, Nov. 1954, p. 42-43, 88-89.

Composition, physical and mechanical properties of three alloys. Photographs, table. (E general, Cu)

378-V. (Book.) **Chemistry of the Lanthanons.** R. C. Vickery. 296 p. 1953. Academic Press Inc., 125 E. 23rd St., New York 10, N. Y. $6.00.

History; occurrence; structure; separation techniques, properties; analytical methods, and applications of the elements whose atomic numbers range from 57 to 71. (EG-g)

379-V. (Book.) **The Light Metals Handbook.** George A. Pagonis. v. I-II. 199 and 185 p. 1954. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3, N. Y. $8.50.

Volume I contains text, and volume II tabular data on aluminum and magnesium-base alloys. Includes analyses, chemical reaction characteristics, mechanical properties, heat treatment, casting and forming characteristics, and joining methods. (Al, Mg)

380-V. (Book) **Ultra High Strength Steels in Aircraft Applications.** 73 p. 1953. Society of Automotive Engineers, Inc., 29 West 39th Street, New York 18, N. Y.

Includes "Composition and Heat Treatment of High Strength Steels", Cyril Wells; "The Development of Steel for Use at High Strength Level", J. M. Hodge, R. D. Manning, and J. A. Bauscher; "Development of a Steel for the 280,000 to 300,000 Psi Tensile Strength Bracket", J. W. Sands; "Processing of High Strength Steel Parts", C. E. Moeller; "Processing of Highly Heat Treated Steel", G. G. Wald; and "Design Considerations in the Use of Ultra High Strength Alloy Steels in Aircraft", D. A. Redwine. (T24, Q general, AY)

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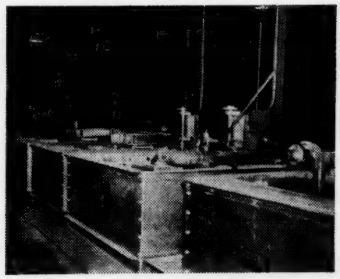

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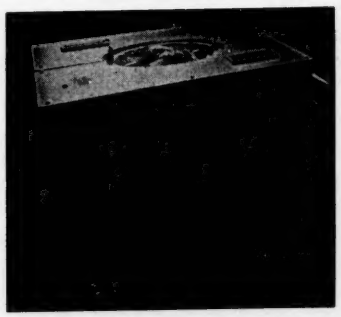

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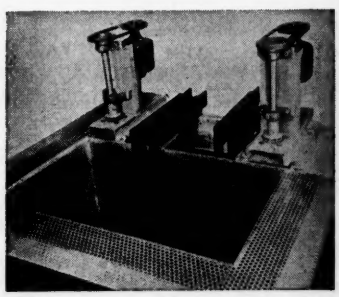

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